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December 1988

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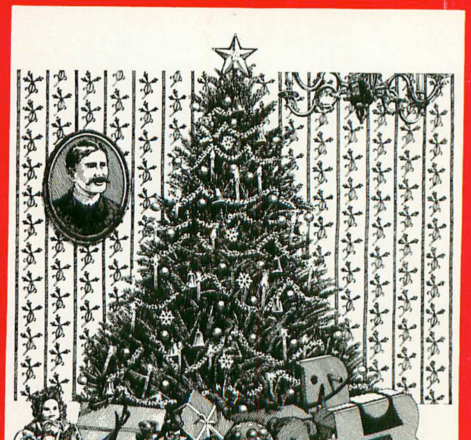

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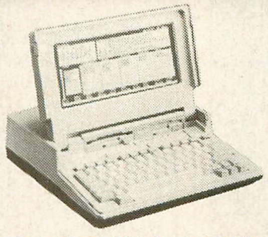

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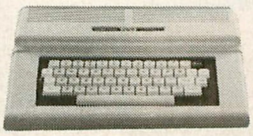

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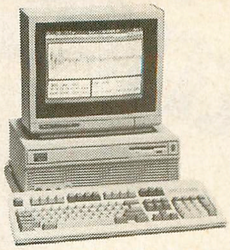

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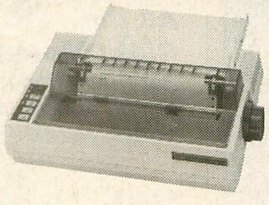

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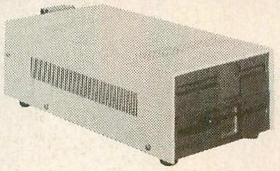

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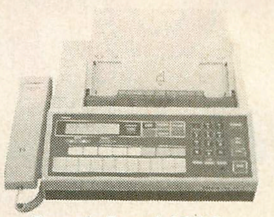

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RAINBOW

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Vol. VII No. 5

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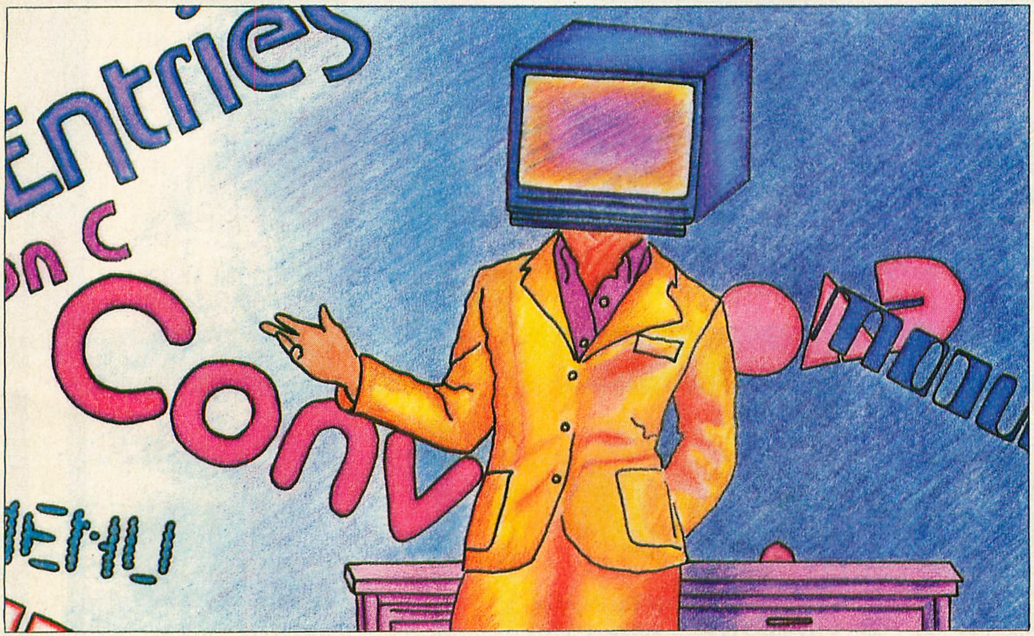

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Letters to the RAINBOW

Don't Leave Home Without It

Editor:

I just received my first subscription issue of RAINBOW. I desperately needed a subscription because I live in a small town. The nearest bookstore is an hour's drive away, and it doesn't carry RAINBOW.

Reading the October issue brought home what it means to miss issues. Several great programs and parts of fascinating continuing-series articles were included in the September issue, and I missed them. I also missed the June and July issues and read with dismay letters praising programs in those issues. In addition, the various columns always have tricks and fixes I can use. I missed three months of all this.

Let's not ignore the ads. How many ads for great programs, nifty hardware products and erudite books did I miss?

I believe the world's greatest invention (at least this month) is the back issue order card. The moral of all this is, of course, subscribe. I'm even considering a RAINBOW ON DISK subscription. It is amazing how much easier it is to type `RUN"` *filename*`"` than to type, and type, and type. Can I afford the subscription? Can I afford *not* to have it?

David Smith
Grand Portage, MN

REVIEWING REVIEWS

Editor:

Since we at SD Enterprises have taken over the VIP line of Color Computer software, we have uncovered a problem with the way some VIP programs work with slower disk drives. The VIP software does not allow sufficient time for some disk drives to come up to speed before reading or writing data.

This problem has been solved by restoring the delay built into Disk BASIC within the software. *VIP Writer III* Version 2.0 and *VIP Database III* do not have this problem.

New versions of the original *VIP Writer, Speller, Database* and *Disk-Zap* for the CoCo 1 and 2, which include this enhancement and additional features, are available for a small fee. See our ads for more details.

Paul Anderson
SD Enterprises

New Brand of Protection

Editor:

I would like to respond to Wayne Montague's letter (October '88). He feels that the copy-protection scheme used on *Kung-Fu Dude* prevented him from booting the game. Unfortunately, this was true. Certain older drives and drives with extremely worn heads had problems with the timing routines needed to execute the game. These events were rare, but they did occur. Therefore, on all newer games (including *Kung-Fu Dude*), we have begun to use a different protection scheme that should be compatible with virtually every system.

I apologize to those who have had problems with the previous protection scheme. This particular problem should not rear its head again.

Glen R. Dahlgren
Sundog Systems

The Company Responds

Editor:

We at Second City Software would like to respond to Wayne Montague's letter to RAINBOW, October '88. Eric Wolf has upgraded his newspaper design system program, *CoCo Newsroom*. As of September 20 of this year, the upgrade is available.

As Mr. Montague stated, one of the biggest complaints with the newspaper design system was the inability to *exit* the Type-Up modular without powering down the system. Other complaints included inefficient program memory use and the lack of special features found in PC-compatible desktop publishing programs.

All of these complaints have been addressed and corrected in *Newspaper Plus*. One of the best features of *Newspaper Plus* is that it is completely compatible with all previous releases.

Second City Software's upgrade policy is as follows:

- Those who bought the newspaper design system from us may receive the update *free of charge*. All they must do is return their original program disk (not the backup copy), and we will replace it with *Newspaper Plus*. There is a $2.50 charge for return postage.
- Anyone who purchased the program from another vendor will be charged a $19.95 upgrade fee (plus $2.50 for postage). They must send that vendor's original disk and original manual.

Second City Software has exclusive rights to *Newspaper Plus*, and effective October 15, we also gain exclusive distribution of all previous versions of the newspaper design system. This includes *The Newspaper* and *CoCo Newsroom*.

We at Second City Software are excited about the *Newspaper Plus* program. We will soon be submitting the upgraded version of the program to RAINBOW for a second look and review.

David Barnes and Ed Hathaway
Second City Software

A Difference in Versions

Editor:

I would like to thank the RAINBOW staff for reviewing *Syntrax 2.0* in the August issue. I would also like to respond to a few items in the review.

In the last sentence of his review, Mr. Ward mentions that if you have a CoCo 3, you should not purchase *Syntrax 2.0*, but wait for the new version, which would be specifically for the CoCo 3. While this may be the path to take, CoCo MIDI users may want to purchase *Syntrax 2.0* (it runs on a CoCo 1, 2 or 3) for their MIDI studios. *Syntrax 2.0* and the new version are substantially different in their approaches. *Syntrax 2.0* caters to individuals who are not keyboard players; the notes can be entered manually from the computer keyboard or in step time from the synthesizer keyboard. Even though there is a real-time entry on *Syntrax 2.0*, the program is stronger in the other entry methods, which are preferred by non-keyboard users.

The new version will cater to keyboard players who would like to record in real time. The new version will also be capable of playing *Syntrax 2.0* files along with the sequences recorded in real time. *Syntrax 2.0, SynLib* and the new version (as yet unnamed) make a strong combination to control most functions of the MIDI studio.

Frank M. Cutolo
Intercomp Sound

HINTS & TIPS

Editor:

Anybody out there who owns a Modemfone 100 from Tandy and doesn't have the RS-232 pack, should use a terminal program (like *MikeyTerm*) and try this simple modification: Purchase a four-pin DIN plug (Cat. No. 274-007). Cut the Modemfone's plug and strip the wires. Solder the Modemfone's wires to the DIN plug as follows:

Pin 1 to blue wire
Pin 2 to white wire
Pin 3 to yellow wire
Pin 4 to black wire

You will not use the orange wire.

I tried this modification on my system, and it works fine.

Denis Guindon
Kapuskasing, Ontario

INFORMATION PLEASE

Editor:

I have a CoCo 3 with a disk drive. I'm using OS-9 Level I Version 2.00 and OS-9 Level II. I have the programs *OS9 Profile* and *Dynacalc*. While *Profile* works on both

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Level I versions but not on Level II, *Dynacalc* works on both levels. Is there a patch to fix *Profile*? Also, both programs were designed with a 64K operating environment. Can they be patched to work in a 512K environment?

Andrew Martin
1702 Cochran Rd.
Eastman, GA 31023

Where to Find a Caret

Editor:

Here are a few questions from a writer and a novice: In the program from "Creating Data Files" (March '88, Page 74), Line 40 includes this character: ^. What is this, and where is it on my CoCo keyboard?

Also, in the past year, I have seen a program in the THE RAINBOW that prints out a directory in a condensed form, so you can put it on a mailing label. I am unable to find this listing in any of my magazines. (The magazines seem to get up and walk away at times.) Does anyone know which issue contains this listing?

Jarman Bryant
2452 N. 17th St.
Milwaukee, WI 53206

The character to which you refer is known as a caret. To get this character on the CoCo's keyboard, press the up arrow key. While you will see an arrow on the screen, the computer will see ^.

The program that prints disk labels with up to 36 filenames and extensions is printed on Page 80 of the February '88 issue.

In 3D

Editor:

When I first saw Mr. Nee's July article on assembly language (Page 100), I immediately tried the examples. To my dismay, they didn't work because I was using *Disk EDTASM*, while Mr. Nee was using the ROM pack version. I wrote to the staff at RAINBOW, who forwarded my question to Mr. Nee. Mr. Nee's reply helped me to fix the problem. Thanks!

Now I have another question: Does anyone out there know how to make 3D pictures on the CoCo? I have the red and green glasses, but I can't get the colors right on my graphics. Any help would be appreciated.

Andrew Ayers
5713 Akers Rd.
Bakersfield, CA 93313

CoCo in the Classroom

Editor:

The world's best Color Computer needs help in the classroom. The CoCo has excellent word processing programs, but these are not supported with training sessions. Some of the PCs have advanced in science by including programs that are used as scientific instrument data collectors. I have heard that there is such a program, *CC-Therm*, for the CoCo. Do you know anything about this or any other programs like it? I hope that a great computer like the CoCo gets some great science hardware and software. New and innovative programs and hardware are necessary to keep the CoCo in the forefront of the industry.

Edgar Anthony
3478 Grafton Rd.
Grafton, OH 44044

REQUEST HOTLINE

Editor:

In your July issue, you presented an article called "Erase All Trace" (Page 118) and the program *DiskOff*. I have been looking for a program to do what *DiskOff* does since I bought my disk drive. However, I have a CoCo 3. Can anyone offer a program similar to *DiskOff* for the CoCo 3?

I am also interested in seeing more CoCo 3 patches and programs offered in THE RAINBOW. It appears that one must go to the BBSs to get the patches I had hoped I would find in your magazine. I wish someone would offer programs with the power seen in some of the IBM software. We have the power in the CoCo 3, but I'm getting impatient waiting to see it unleashed.

Finally, why don't you make winning CoCo Gallery pictures available on RAINBOW ON TAPE and DISK? I feel somewhat orphaned since RAINBOW has gotten involved with Delphi. It seems that the best place to look for information is in a BBS rather than THE RAINBOW. I'd sure like to see THE RAINBOW aimed toward the reader and not the modem.

Bob Kult II
2800 S. Apple Ave.
Marshfield, WI 54449

Jeremy Spiller has produced a modified version of DiskOff *for the CoCo 3, called* DiskOff 3. *(See "What Disk Drive?" Page 100 of this issue.) THE RAINBOW does not include CoCo Gallery winners on* RAINBOW ON TAPE *and* DISK *because the length of these graphics programs would force us to use two disks or tapes, raising the subscription price significantly.*

Looking for One Program That Does It All

Editor:

I have been a Color Computer owner since 1982 and was among the first in my area to purchase a CoCo 3. I enjoy my machine and have purchased a number of programs to increase its utility. However, I have a problem with the state of CoCo software. First, let me list a few CoCo packages and their virtues:

Telewriter-6/128: a user-friendly word processor; *Sideways*: prints out wide spreadsheet documents; *Textform*: allows double-column printing; *Ultra-Editor*: full screen editing, with more than one file in memory at a time; *Spell-n-Fix*: spelling checker; *Merge 'n Mail*: database and mail merge; *Hi-Res III Screen Commander*: displays all possible character types; *CoCo Max III*: graphics; *Calligrapher*: a variety of fonts; *Picture Perfect*: universal printer driver.

With all these great packages, what is my complaint? They aren't integrated into one program. If the unique features of each of these packages could be combined, we could print normal, wide or double-columned documents, mix fonts, check spelling, import graphics, etc., and have true WYSIWYG page previews. I would be willing to pay more than the price of the individual programs combined for this ability.

No program package on the market can do everything the packages I listed could do together. Please don't tell that this can't be done. We have the individual programs; we need to put them all together. Until we do, our software will remain years behind IBM and decades behind Macintosh, Amiga, etc.

Michael Strong
P.O. Box 39
Ypsilanti, MI 48197

KUDOS

Editor:

I've owned my Color Computer for three years, and in those three years, I've purchased a lot of software from Radio Shack. I thought this was my only source until a friend loaned me a copy of THE RAINBOW. I've purchased excellent products from at least four of your advertisers and have been very pleased. I was impressed with one company in particular: T&D Software. It made prompt delivery to Canada and offered a variety of good programs. Keep up the good work!

Ron Woodruff
Ottawa, Ontario

Good Prices and Good Service

Editor:

We usually accept that getting an exceptionally low price on a standard item means that we won't get much service with it. But this does not have to be so, and one of your advertisers just proved that to me.

I recently ordered a CoCo 3 by phone from MicroWorld, whose price was significantly lower than any other I could find. Mark, who took my order, explained that my Multi-Pak Interface could be upgraded by replacing one part — thus avoiding the purchase of a new one. When I asked about installation, he quoted a price so low that I though I had misheard him. I mentioned that I was having some problems with either my Multi-Pak or my computer. When I received my upgraded Multi-Pak from MicroWorld, I also got a note from the technician who had tested my Pak for three hours and had found nothing wrong with it. There was no charge for the testing. Don't you think MicroWorld deserves a pat on the back? I do.

Dr. Hugo D. Spatz
Port Charlotte, FL

To the Rescue

Editor:

First I would like to comment on a letter in the August '88 issue from a gentleman who had outgrown THE RAINBOW. I am 32 years old, and I hope to never outgrow the magazine that adds so much enjoyment to my hobby.

Second, I must acknowledge Zebra Systems, which has put forth exceptional effort in customer satisfaction. I purchased a copy of *CoCo Graphics Designer* from a Canadian supplier. I could not get the program to run after the initial start-up screen, so I contacted the company from which I had purchased the program. I was told that I could wait a few weeks until a new version arrived. I then phoned Zebra Systems and all my problems disappeared, when a copy of the latest version of the software arrived that same week. The program I received works perfectly. Thanks Zebra Systems for a job well done.

Stephen Duff
Edmonton, Alberta

Unmixed Order

Editor:

Out of all the companies advertised in your magazine that I have dealt with, Dr. Preble's Programs has been the best to work with. Recently, there was a mix-up about my order. When I called the company, I talked with Bonnie. She was cooperative and understanding. When I had trouble with a piece of hardware, the people at Dr. Preble's Programs were easy to deal with. Keep up the good work.

Denver Page
Waitsburg, WA

BACK TALK

Editor:

The article, "Assembly Language for the Complete Novice," by William Barden, Jr., [September '88, Page 150] was a fine introduction to assembly language programming of the CoCo. However, the article can be faulted at the end where books containing further information are recommended. The recommended books are either no longer in print or don't address any of the CoCo components other than the 6809.

The glaring omissions to the recommended books are *Assembly Language Programming for the CoCo and the CoCo 3*, published by TEPCO. These not only describe all the 6809 instructions and provide examples, but also describe the other components such as the VDG, SAM, joystick, GIME, etc. They are also immediately available and can be ordered as advertised in RAINBOW.

Laurence Tepolt
TEPCO
Portsmouth, RI

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type `RAI` to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type `LET` to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

Word Power 3.2

> *"... friendly...amazing execution speed...much easier to use than VIP software & 2 other word processing systems I've tried...very user-friendly...massive text storage capacity ...highest among word processors..."* - **Rainbow Oct. 88 Review for Word Power**

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Unparalleled Power packed in this 100% ML Word Processor written from scratch for the CoCo 3! **No other word processor offers such a wide array of features that are easy to learn & use.**

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Word Power 3.2 runs at double-clock speed and uses the **true 80-column display** with lowercase instead of the graphics screen. The result is lightning fast screen reformatting and added speed! **All prompts are displayed in plain English in neat colored windows**. The current column number, line number, page number, percentage of free memory is displayed at all times. Even the **page break** is displayed so you know where one page ends and the other begins. The Setup program allows you to change fore/background colors as well as (in)visible carriage returns. Word Power 3.2 can be used with RGB/Composite/Monochrome monitors as well as TV.

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Word Power 3.2 gives you **over 72K** on 128K and **over 450K** on 512K CoCo 3 for Text Storage - more memory than any other CoCo word-processor. Period.

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Word Power 3.2 has one of the **most powerful and user-friendly full-screen editor with word-wrap.** All you do is type. Word Power takes care of the text arrangement. The unique **Auto-Save** feature saves text to disk at regular intervals for peace of mind.

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Splits the screen in half so you can view one portion of your text while you edit another. You'll love it!

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UPS NEXT DAY AIR

A Season for Reflection

When I sit down to write this column, there is almost always something on my mind that pretty much gets to be the subject of the month. Frankly, because there are so many issues, so many rumors, so many interesting developments in the CoCo Community, it seems there is always something to talk about.

I guess what I say here in THE RAINBOW is of some interest. Our surveys of your reading attitudes show that this column is one of the better-read parts of the magazine. That surprises me a bit, partly because I almost never read "editor's columns" in general-purpose magazines and partly, of course, because I sometimes really do wonder if what I am saying is relevant to the CoCo Community.

Perhaps another reason is that we've always tried to keep THE RAINBOW from being an "issues" magazine. By that, I mean we strive to have not "learned articles" by "experts" so much as practical things that you can do and use with your CoCo. I've gotten a number of magazines like that, and I always find they leave me with a taste for something more.

So, to a large extent — except for an article or short series here and there — THE RAINBOW has always tried to be a user's magazine. But I do think there is a place for some commentary on "the issues," and I've tried to do that here.

This being the December issue, I thought it might be appropriate to look back on 1988. Business here at THE RAINBOW is growing. We're pleased with our circulation, we're seeing a number of new people and companies becoming involved in advertising, we've done some things internally to strengthen Falsoft. We're also at work on several new projects you will be hearing about in 1989 that we hope will enhance your use and enjoyment of your CoCo. After all, that's what we are all about.

On a personal level, the wedding of my daughter Wendy and Ira Barsky in July certainly was a highlight of the year for all of us. Of course, as in any year, not all the events that 1988 brought were as joyous as that one, but in the midst of it all, there have been friends, family and associates here, and — from many of you who heard one thing or another — *encouraging* cards, notes and even messages on Delphi. I've really been touched by that sense of true Community — after all, that's what *living* is all about.

I'm confident that 1989 will be a good year for all of us. I hope you look forward to it as much as I do. And in the meanwhile, all of us here at Falsoft extend our heartiest wishes for a happy holiday season to each of you.

— Lonnie Falk

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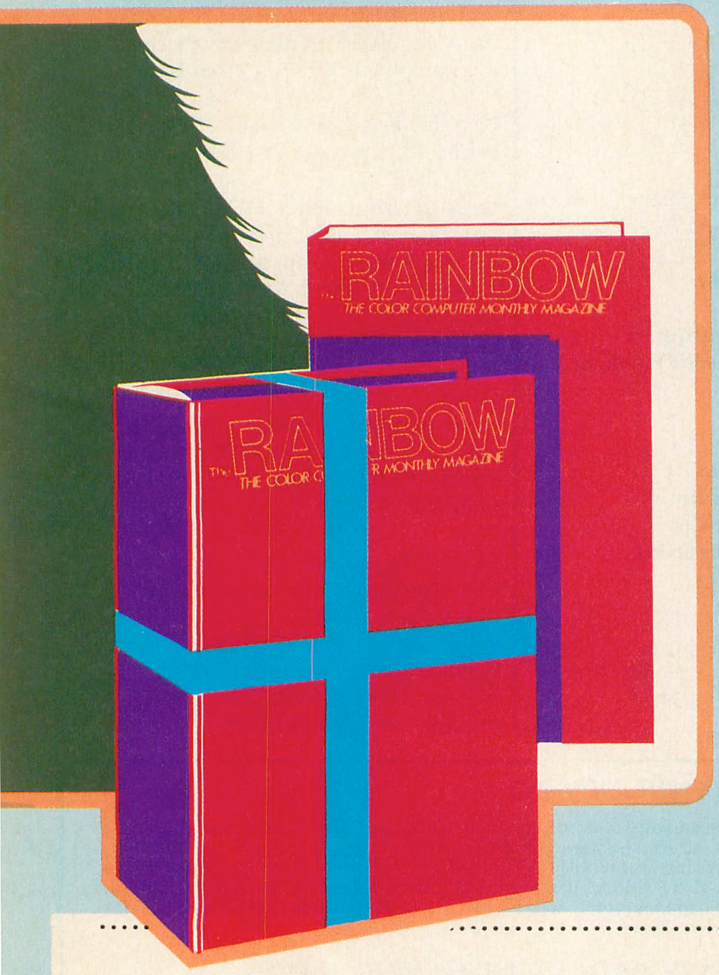

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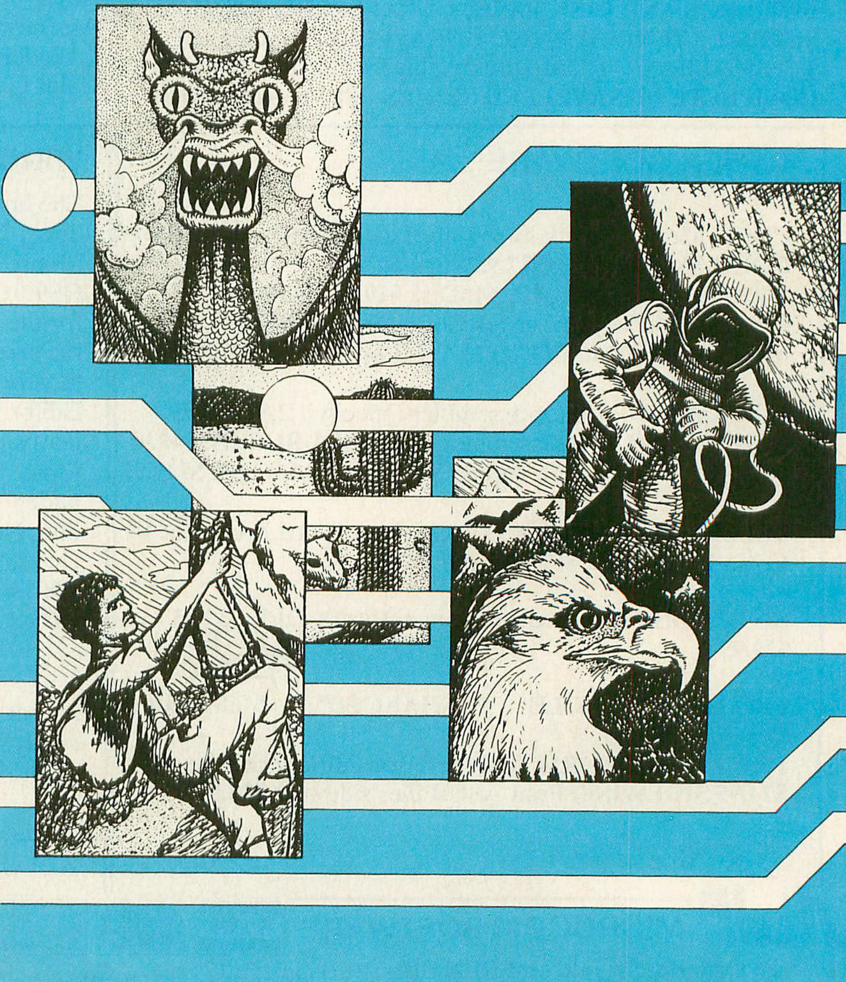

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There are a lot of dealers selling disk drives for the CoCo. Why buy from us? **First**, all our drives are Brand New and made by Fujitsu. They are sleek, quiet and have a reputation of superb reliability. **Second**, our Drive 0 systems come with the acclaimed DISTO Controller - with gold-plated contacts. **Third**, our Drive 0 systems come with the official 200 page Radio Shack Disk Manual with floppy disks; everything you need to get started. **Fourth**, you get $60 worth of our utility software (Disk Util 2.1A & Super Tape/Disk Transfer) & our DISKMAX software which allows you to acess BOTH sides of our drives. Our drive systems are head & shoulders above the rest.

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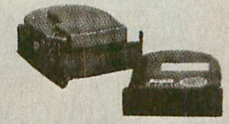

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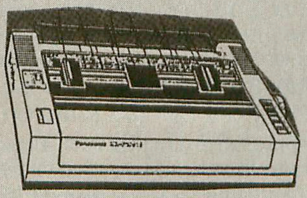

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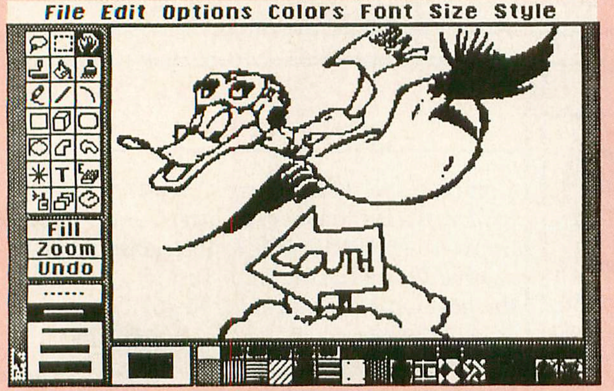
NEW REAL DESKTOP

CoCo Max™ III AND



CoCo Max III is absolutely the best drawing package available for the CoCo 3, and it does more than just let you draw. **CoCo Max III** includes animation, text, color mixing and more features than you would think possible. It combines incredible speed with dazzling graphics and it is a joy to use even its most powerful features.

Pictures, graphs, flyers, cards, signs, school projects, labels, buttons and anything else you might dream of creating is now possible with **CoCo Max III**. Is it any wonder that the majority of CoCo Gallery pictures in the last five months were created with **CoCo Max**?

Thousands of CoCo users have found that you don't have to be an artist to have fun with **CoCo Max**. You'll wonder why you waited so long to get the incredible **CoCo Max III**.

CoCo Max III is the best because it includes:
- a huge picture area (*two* full hi-res 320x192 screens) - a large editing window - Zoom mode for detail work - 28 drawing tools which you just point and click on - shrink and stretch - rotation at any angle (1.5 degree steps) - 512K memory support (*all* features work with 128K too) - an Undo feature to correct mistakes - you can even Undo an "Undo" - Animation - special effects - color sequencing (8 colors, variable speed) - thirteen fonts (more available) - each font has eight different sizes - five style options (bold, italic, 3D, etc.) for thousands of font/size/style combination possibilities. - the CoCo Show "slide show" program - color editing of patterns - automatic pattern alignment - prints in single and double size - smart lasso (move text over a background...) - advanced tools: arc, ray, cube, etc. - select 16 of the 64 colors (all 64 colors are displayed at once for selection!) - picture converter (CoCo Max II, MGE, BASIC) - extensive prompting - "glyphic" clipbook of rubber stamps - double click shortcuts - color mixing (additive/subtractive/none) - money back guarantee - sophisticated data compression saves disk space - pull down menus (no commands to remember) - forty paintbrush shapes - two color lettering - spray can - scrapbooks of pictures - error free - Y-cable or multipack not required - high speed hi-res interface included (plugs into joystick port) - disk is not copy protected - amazing "flowbrush" - RGB and composite monitor support - replace color - printing on black and white printers in five shades of gray - full color printing with optional drivers for the NX-1000 Rainbow and CGP220 - entirely rewritten for the CoCo 3

> There are no limits to what you can do with this fabulous program. Speed, ease, animation, power and color, all in one package. **CoCo Max III** is the ultimate program for the CoCo 3. –Rainbow review 4/88

CoCo Max III: $79.95

Max-10 owners: deduct $10

System Requirements:
CoCo 3 disk system and a Joystick or Mouse

Printer drivers included:
IBM/Epson and compatibles, GEMINI, DMP105/106/130,OKI182/192, CGP220 (B&W), DMP110, DMP200

Color printer drivers (prints 125 different colors) Star NX-1000, CGP-220, or Okimate 20 each **$19.95**

For all CoCo Max Versions

Max Edit Font Editor: A font is a set of characters of a particular style. With Max Edit you can create new fonts or modify the existing ones. **$19.95**

Max Font disks (send for list) each **$19.95**

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DS69/69B Digitizers: allows you to capture the image from a VCR or video camera and bring it into your computer. CoCo Max will let you load digitized pictures and modify them.

DS-69 (2 images per second. Requires multipak) **$99.95**

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CoCo 1 & 2 Owners Still Available:

(See previous ads or write for information)

CoCo Max II (works on all disk CoCos) **$69.95**

CoCo Max Tape (CoCo 1 & 2 only) **$59.95**

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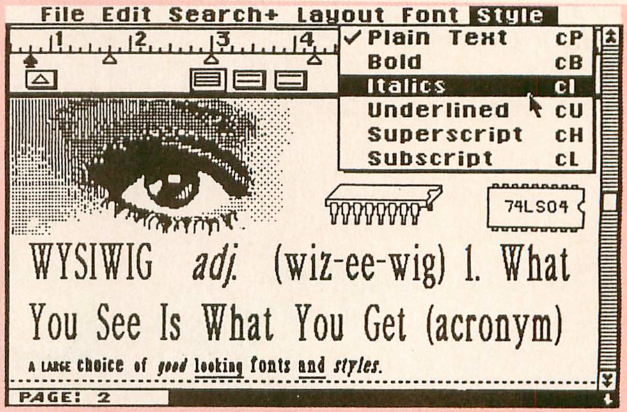


WYSIWIG *adj.* (wiz-ee-wig) 1. What You See Is What You Get (acronym)

A LARGE **choice** of *good* looking **fonts** and *styles.*

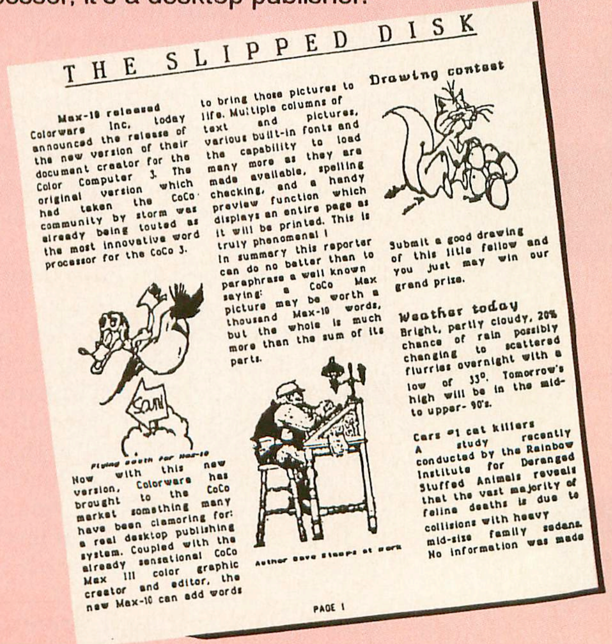
PAGE: 2

THE DAZZLING WORD PROCESSOR

You probably already have a word processor, and you probably wish it had these features:

- Fully menu driven (CoCo Max style) with point and click marking of text. You don't need the arrow keys!
- True WYSIWYG (What You See Is What You Get) including variable size fonts, styles (bold, italics, etc.) and graphics.
- Can print multiple columns on a page.
- Not limited by printer capabilities: fonts up to 24 points (1/3") high, superscripts, small print, etc.
- Fully integrated spelling checker (incredibly fast), no need to exit program to check spelling.
- Graphics can be imported from just about anything (CoCo Max; MGE; BASIC; even Macintosh pictures from a BBS) and resized to fit your document.
- Full screen preview including graphics.

Max-10 has all these unique features, plus all the features you are used to in your current word processor. Even with all this, you don't give up anything. **Max-10** is easier to use, more intuitive, faster and more powerful than anything else. It's not just a word processor, it's a desktop publisher.



THE SLIPPED DISK

Max-10 released
Colorware Inc. today announced the release of the new version of their document creator for the Color Computer 3. The original version which had taken the CoCo community by storm was already being touted as the most innovative word processor for the CoCo 3.

Flying south for Max-10

Now with this new version, Colorware has brought to the CoCo market something many have been clamoring for: a real desktop publishing system. Coupled with the already sensational CoCo Max III color graphic creator and editor, the new Max-10 can add words

to bring those pictures to life. Multiple columns of text and pictures, various built-in fonts and the capability to load many more as they are made available, spelling checking, and a handy preview function which displays an entire page as it will be printed. This is truly phenomenal !
In summary this reporter can do no better than to paraphrase a well known CoCo Max saying: a picture may be worth a thousand Max-10 words, but the whole is much more than the sum of its parts.

Author Dave Sleeps at work

Drawing contest

Submit a good drawing of this litle fellow and you just may win our grand prize.

Weather today
Bright, partly cloudy, 20% chance of rain possibly changing to scattered flurries overnight with a low of 33°. Tomorrow's high will be in the mid- to upper- 90's.

Cars #1 cat killers
A study recently conducted by the Rainbow Institute for Deranged Stuffed Animals reveals that the vast majority of feline deaths is due to collisions with heavy mid-size family sedans. No information was made

PAGE 1

Max–10: $79.95

CoCo Max III owners: deduct $10

Max–10 requires a CoCo 3, at least 1 disk, & joystick or mouse

Printer drivers included: IBM/Epson and compatibles; DMP 105, DMP106, DMP130; CGP220 (B&W); Gemini/Star

Some of the many features of **Max–10:**

– Blinding speed – printing in multiple columns – online dictionary – spell checking – graphics can be mixed with text – full justification of proportionally sized characters – bold, italic, underline superscript and subscript type styles – superb file support, just point and click – "Undo" lets you correct mistakes – easy to use, no commands to remember – any graphics program can be used – pictures can be shrunk or stretched to fit – right and left alignment – centering – variable line spacing – page numbering – current page number displayed on the screen – variable tab stops – left and right margins – tabs and margins can vary in the same document – cut and paste text and graphics anywhere in the file – page break shows on the screen – pull down menus are quick and simple to use – lightning fast access to any point in the document with the scroll box – twenty fonts (styles and sizes), more available – any number of character sizes and styles can be mixed on the same line – up to more than 120 characters per line, depending on font size, style and letters – headers and footers, even with graphics – file compatibility with other word processors – right, left, bottom and top margins – word wrap – set starting page – type ahead – key repeat – key click – scroll up and down – ASCII file output for compatibility – disk directory – kill files– block cut, copy and move – global search and replace – paragraph indent – clipboard – merge – show file (on disk) – free memory display – page count – paragraph count – word count – graphics can be resized and moved – multiple fonts – error recovery – true lowercase – 512K memory support (all features work with 128K too) – complete point and click cursor control – moving, clearing and changing blocks of text is ridiculously easy, just point and click at each end of the text block – onscreen ruler – preview file before loading – search and replace – disk is not copy protected – more than 35 pages of text

CoCo Max III and Max–10 Perfect Together

You do not *need* **CoCo Max III** to insert and print graphics in **Max–10**. Max–10 works with any graphics creation program, and you can also use graphics downloaded from bulletin boards.

Similarly, you do not *need* **Max–10** to create graphics with text in **CoCo Max III**. There are tremendous lettering capabilities in **CoCo Max III**, with its many fonts, styles, and sizes.

Together **Max–10** and **CoCo Max III** are an unbeatable combination. This desktop publishing system is better than anything you've ever seen on a CoCo. We are so confident that you will use, and enjoy using the two software packages, that we offer an unconditional money back guarantee. Stop wasting your time and effort using inferior or obsolete products. Move up to the new generation of CoCo software now.

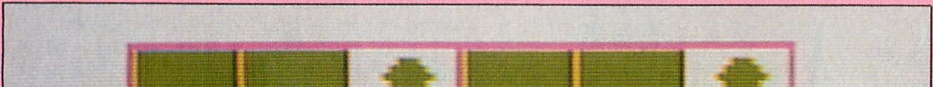
Can you plant the royal Christmas trees as the king desires?

The Christmas Tree Puzzle

By Mike Moore

There is a panic on the palace grounds. The king has bought a dozen Christmas trees and wants them planted in the courtyard. The courtyard is a six-by-six square, and each square is large enough to hold one tree. While that should leave you plenty of room to plant 12 trees, the king likes his garden to look haphazard — no plants (or trees) are in rows.

The king has had two of the trees planted in opposite corners of the garden. Now you must plant the other 10. The trees must be placed so that no three trees will form a straight line (not even diagonally). To make sure you don't make such a mistake, the rest of the royal gardeners will lay grass in all the squares that form such a path. If you later decide to replant a tree, the gardeners will remove the grass so that you may try again. Since the actual planting and digging of trees is extremely hard work, the king will allow you to use your trusty CoCo to solve the puzzle.



When you run *Tree Puzzle*, you will see the six-by-six courtyard with the first two trees planted at opposite corners of the yard. In the middle of the screen, you will see a cursor in the shape of a plus sign. Use the arrow keys to move the cursor to any square you choose. Once you arrive at the desired square, press P to plant a tree. If you want to remove a tree, press D to dig it up. (Note: You cannot dig up the two original trees.)

Each time you plant a tree, the squares that are no longer usable change from buff to green. You cannot plant a tree on a green square. If you decide to dig up a tree, any squares that are affected will return to the buff color.

If you manage to plant all of the trees, the screen will flash "Well Done" until you press a key. To quit playing, press Q. If, on the other hand, you just want to start over without digging up all the

---

Mike Moore is a math professor at Carleton University in Ottawa, Canada. Mike shares his love of the CoCo with his son, who — since his father's purchase of a CoCo 3 — now uses the family's CoCo 1.

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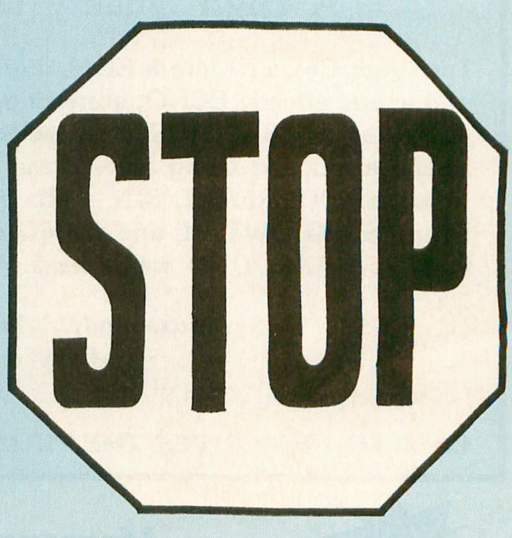

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-Cray Augsburg, June '88 Rainbow Review

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CoCo Max III (CoCo III only) See April '88 review. Built in Animation! / Amazing Color Sequencing!!! Comes with Hi-Res Interface, MINILOAD/BAS, Demo Disk, CoCo Show Pgm. Requires Joystick or mouse. SALE $74.95

MULTI-LABEL III (CoCo III only) See July '87 review. An easy to use, versatile label creating program including many new CoCo III features. Print multiple fonts on each label! This one's a MUST for the CoCo III!! Disk $16.95

FKEYS III (CoCo I/II/III) See April '87 review. A user friendly, programmable function key utility that creates up to 20 function keys. EDITOR, DOS mods, Single or Double sided, 35/40 tracks, DISABLE, and it's EPROMable!. Disk .. $19.95

SIXDRIVE (CoCo I/II/III) This machine language utility modifies DECB 1.0, 1.1, FKEYS III, or ADOS to allow the use of 3 double-sided drives (or 2 D/S drives and **J&R's RAMDISKS**) as 6 S/S drives. Disk $16.95

AUTO DIM (CoCo III only) See Jan. '88 review. This hardware device protects your monitor, or TV from IMAGE BURN after a few minutes of inactivity from your keyboard. Illustrated and easy to install. Hardware $29.95

MPI-CoCo Locking Plate (CoCo III only) See Sept '88 review. Protects your CoCo III and Multi Pak Interface from destroying each other! Please specify MPI number 26-3024 or 26-3124 when ordering! SALE $7.95

NEW **Warrior King** (CoCo III only) Become Rastann, Warrior King, on the quest to regain his rightful crown hidden deep within a sinister land. Battle monsters, gain magic & weapons, and travel thru harsh wilderness & dark castle dungeons in this medieval realm. From the creator of Kung-Fu Dude comes this awesome arcade game for the CoCo III! Uses the most detailed 320 x 200 16 color graphics & high speed ML code to vault you into a world of fantasy! Dare ye challange the many perils ahead to become Warrior King? Requires 128k CoCo III, Disk drive, and Joystick $29.95

HALL OF THE KING TRILOGY (CoCo I/II/III) See June '86 & Nov '87 reviews. The epic adventure is back! The largest adventure campaign ever seen for the CoCo is again available. A total of 6 DISK SIDES of intense graphics adventure will have you playing for weeks! Each section is a 2 disk stand alone adventure, but all 3 together form an epic saga! Quest for the legendary Earthstone in the ancient dwelling of the dwarves while you enjoy the classic graphics that made this trilogy famous! Each adventure can be purchased separately for only $29.95, the lowest price ever, or you can SAVE and purchase the entire set for only $74.95. Requires 64k, Disk drive, (and composite monitor for the CoCo III). Please specify HALL of the King I, II, or III .... $29.95 each or the entire 6 DISK Trilogy for only $74.95

In Quest of the Star Lord (CoCo III only) See Aug '88 review. This is **THE** graphics adventure for the CoCo III! Unparalleled 320 x 200 animated graphics will leave you gasping for more! You quest for the Phoenix Crossbow in this post-holocaust world of science and fantasy. Full **4 Disk sides** of mind-numbing adventure! Requires 128k CoCo III and Disk drive. **HINT SHEET** .... $3.95 (+ $1.00 S&H by itself) Disk $34.95

KUNG-FU DUDE (CoCo I/II/III) See Feb. '88 review. An exciting arcade game. The **BEST** karate game ever for the CoCo! Destroy opponents and evade obstacles as you grow ever closer to your ultimate objective! Spectacular graphics, sound effects, and animation! Requires 64k, Disk drive, and Joystick. Now displays color on CM8. Disk $24.95

PYRAMIX (CoCo III only) See Dec. '87 review. Brilliant colors, sharp graphics, and hot action in this 100% ML arcade game. You'll enjoy hopping Kubix around the pyramid, avoiding Kaderf, Smack, Smuck, & the Death Square! Disk .. $19.95

NEW **AD&D Character's Companion** (CoCo I/II/III) This great timesaving utility helps create compatible AD&D characters. Includes dice rolling routine, pick ability, race & class. Buy from the Players Handbook, magic items & spell materials. Save, load, and print character info. 3 Disk sides $24.95

White Fire of Eternity (CoCo I/II/III) See Dec '86 review. Enter the era of monsters & magic. Search for the legendary power of White Fire throughout the Forbidden Wood & Dark Caverns in this 64k animated adventure! Disk..$19.95

Champion (CoCo I/II/III) See May '87 review. Become a superhero in this action adventure! Disk..$19.95

Dragon Blade (CoCo I/II/III) See Nov '86 review. Slay evil dragon in this 64k animated adventure! Disk..$19.95

trees, press R. Both of these options will ask you if you are sure of your decision. Press Y to confirm your decision; press N to return to the game in progress.

If you think you have tried all possible solutions and want to see the answer, run the program and quit without planting any trees. Then type `GOTO 970` to see the solution.

The king would like all his Christmas trees planted before the holiday begins, so good luck in solving this puzzle.

(Questions or comments about this program may be directed to the author at 2 Aurora Crescent, Nepea, ON, Canada K2G 0Z7. Please include an SASE when requesting a reply.) □

The listing: TREEPUZZ

```
0 CLS:PRINT@69,"CHRISTMAS TREE P
UZZLE":PRINT@200,"BY MIKE MOORE"
10 PMODE1:PCLS:FORX=0TO5
20 FORY=0TO5:LINE(30*X,30*Y)-(30
*X+30,30*Y+30),PSET,B
30 NEXTY,X
35 SCREEN1,1
40 DIMP(5,5),T(9),C(4)
50 DRAW"BM15,177C2U6L6E6L6E6L4E4
R4F4L4F6L6F6L6D6L4
60 PAINT(17,170),2,2:GET(2,152)-
(28,178),T,G
70 PUT(152,2)-(178,28),T,PSET
80 FORI=0TO5:FORJ=0TO5:P(I,J)=1:
NEXTJ,I
90 P(0,5)=2:P(5,0)=2
100 GOSUB730
110 S$="*PD^"+CHR$(10)+CHR$(9)+C
HR$(8)+"RQ"
115 R=75:D=75
120 GOSUB720
130 ONINSTR(S$,INKEY$)GOTO130,14
0,150,160,170,180,190,200,210:GO
TO130
140 X=(R-15)/30:Y=(D-15)/30:IFP(
X,Y)<>1THENSOUND200,2:GOTO130
143 PUT(R-13,D-13)-(R+13,D+13),T
,PSET
145 P=P+1:IFP<10THENP(X,Y)=2:GOS
UB730:GOTO115ELSE500
150 X=(R-15)/30:Y=(D-15)/30:IFP(
X,Y)<>2THENSOUND200,2:GOTO130
151 IF (X=5ANDY=0)OR(X=0ANDY=5)T
HENSOUND250,3:GOTO130ELSEP=P-1
153 P(X,Y)=1:FORX=0TO5:FORY=0TO5
155 IFP(X,Y)<2THENP(X,Y)=1:C=30*
X+2:D=30*Y+2:LINE(C,D)-(C+26,D+2
6),PRESET,BF
157 NEXTY,X:GOSUB730:GOTO115
160 GOSUB720:IFD>15THEND=D-30ELS
ED=165
165 GOTO120
170 GOSUB720:IFD<165THEND=D+30EL
SED=15
175 GOTO120
180 GOSUB720:IFR<165THENR=R+30EL
SER=15
185 GOTO120
190 GOSUB720:IFR>15THENR=R-30ELS
ER=165
195 GOTO120
200 GOSUB220:IFA THENRUNELSESCRE
EN1,1:GOTO130
210 GOSUB220:IFA THENENDELSESCRE
EN1,1:GOTO130
220 CLS:PRINT@233,"SURE(Y/N)"
230 A=INSTR("*NY",INKEY$)-2:IFA<
0THEN230ELSERETURN
500 PLAY"T20ABCDABCDABCD":CLS:PR
INT@233,"WELL DONE!!"
510 FORI=0TO500:NEXT:IFINKEY$<>"
"THENEND
520 SCREEN1,1:FORI=0TO999:NEXT:G
OTO500
720 PUT(R-2,D)-(R+6,D),T,NOT:PUT
(R+2,D-4)-(R+2,D+4),T,NOT:RETURN
730 FORJ=0TO5
740 FORI=0TO5
750 IFP(I,J)=2GOSUB800
760 NEXTI,J:RETURN
770 P(X,Y)=0:C=30*X+2:D=30*Y+2
780 LINE(C,D)-(C+26,D+26),PSET,B
F
790 RETURN
800 IFI=5THEN850
810 Y=J:FORX=I+1TO5
820 IFP(X,Y)<2THEN840
830 FORX=0TO5:ONP(X,Y)GOSUB770
840 NEXT
850 IFJ=5THENRETURN
860 FORU=J+1TO5
870 FORA=0TO5
880 IFP(A,U)<2THEN960
890 AB=ABS(A-I):IFAB=0ORAB=U-J T
HEN SU=1:SA=SGN(A-I):GOTO920
900 IFAB=2*(U-J)THEN SU=1:SA=2*S
GN(A-I):GOTO920
910 IFU-J<>AB*2THEN960ELSE SU=2:
SA=SGN(A-I)
920 X=I:Y=J
930 X=X+SA:Y=Y+SU:IFX>=0ANDX<6AN
DY<6THENONP(X,Y)GOSUB770:GOTO930
940 X=I:Y=J
950 X=X-SA:Y=Y-SU:IFX>=0ANDX<6AN
DY>=0THENONP(X,Y)GOSUB770:GOTO95
0
960 NEXTA,U:RETURN
970 SCREEN1,1:X=2:Y=5:U=0:GOSUB9
80
972 P=10:Y=4:GOSUB980:X=4:GOSUB9
80
974 Y=1:X=1:GOSUB980:Y=3:GOSUB98
0
976 X=0:GOSUB980:GOSUB730:GOTO11
5
980 P(X,Y)=2:PUT(30*X+2,30*Y+2)-
(30*X+28,30*Y+28),T,PSET:A=X:X=Y
:Y=A:U=1-U
990 IFU THEN980ELSERETURN
```

VIP Writer III 2.0

495K Total Text Space • EASY 4 Color MENUS

"In the beginning there was VIP Writer and users saw that it was good, But it's not the best anymore. There's a new word processor to claim the crown...VIP Writer III –Setting the Standard" **–RAINBOW Sept. 1988**

COMPARISON CHART

	VIP Writer III	Telewriter 128	Word Power 3.2
Screen Display	32/40/64/80	40/80	80
Spelling Checker	VIP Speller	NONE	FREE WARE
Dictionary Size	50,000 Words	NONE	20,000 Words
RGB HD Support	100%	N/A	NO
Print Spooler	YES	NONE	YES
Total Space 128K	**106,000**	48,000	72,000
Total Space 512K	**495,000**	48,000	450,000

N/A – Information is Not Available. Numbers rounded to nearest thousand.

MORE SCREEN DISPLAY OPTIONS

VIP Writer III offers more screen width options -all with 24 lines and actual lower case letters using the CoCo 3's hardware display. It runs at double clock speed and has 4-color menus making VIP Writer III FAST and EASY to use! You can choose foreground, background, hilite and cursor colors from up to 64 hues. Color can be turned ON or OFF for the best possible display using a monochrome monitor or TV set. VIP Writer III has a context sensitive help facility to display command usage in easy to read colored windows.

CUSTOMIZER & PRINTER INSTALLER

VIP Writer III comes with a configuration / printer installation program which lets you customize VIP Writer III to suit your own liking. You can set screen width and colors as well as margins and more. You can also install your own printer and set interface type (serial, parallel or J&M), baud rate, line feeds, etc. Once done, you never have to enter these parameters again! VIP Writer III will load n' go with your custom configuration every time!

ASCII TEXT FILE STORAGE

VIP Writer III creates ASCII text files which are compatible with all other VIP Programs as well as other programs which use ASCII files. You can use VIP Writer III to even type BASIC programs! There is a 48K text buffer (438K in a 512K CoCo 3) and disk file linking allowing virtually unlimited text space. VIP Writer III works with up to four disk drives and lets you display directories and free space as well as rename or kill disk files. In addition VIP Writer III is 100% compatible with the RGB Computer Systems Hard Disk.

POWERFUL EDITING FEATURES

VIP Writer III has a full featured screen editor which can be used to edit text with lines up to 240 characters long with or without automatic word wrap around. You can select type-over mode or insert mode. There is even an OOPS command to recall a cleared text buffer. Other editing features include: Type-ahead • typamatic key repeat and key beep for flawless text entry • end of line bell • full four way cursor control with scrolling • top of textfile • bottom of textfile • page up • page down • top of screen • bottom of screen • beginning of line • end of line • left one word • right one word • DELETE character, to beginning or end of line, word to the left or right, or entire line • INSERT character or line • LOCATE and/or CHANGE or DELETE single or multiple occurrence using wildcards • BLOCK copy, move or delete with up to TEN simultaneous block manipulations • TAB key and programmable tab stops • word count • line restore • three PROGRAMMABLE FUNCTIONS to perform tasks such as auto column creation and multiple copy printing.

Writer III or Library /W owners: Upgrade to the VIP Writer III 2.0 for $10 + $3 S/H. Send ORIGINAL disk and $13 total.

AUTOMATIC TEXT FORMATTING

VIP Writer III automatically formats your text for you or allows you to format your text in any way you wish. You can change the top, bottom, left or right margin and page length. You can set your text flush left, center or flush right. You can turn right hand justification on or off. You can have headers, footers, page numbers and TWO auxiliary lines which can appear on odd, even or all pages. You can also select the line on which they appear! You can even change the line spacing! Parameters can be altered ANYWHERE !

PREVIEW PRINT FORMAT WINDOW

VIP Writer III features an exclusive format window which allows you to preview your document BEFORE PRINTING IT! You are able to move up, down, left and right to see centered and justified text, margins, page breaks, broken paragraphs, orphan lines etc.

PRINTING VERSATILITY

VIP Writer III prints TWICE as fast as any other CoCo word processor! It supports most serial or parallel printers using J&M JFD-CP or Rainbow interface and gives you the ability to select baud rates from 110 to 19,200. You can imbed printer control codes anywhere in your text file EVEN WITHIN JUSTIFIED TEXT! VIP Writer III also has TWENTY programmable printer macros which allow you to easily control all of your printers capabilities such as bold, underline, italics and superscript using simple key strokes. Other features include: multiple copy printing • single sheet pause • line feeds.

BUILT IN PRINT SPOOLING

Save up to $150 on a print spooler because VIP Writer III has a built in print spooler with a 57,000 character buffer which allows you to print one document WHILE you are editing another. You don't have to wait until your printer is done before starting another job!

50,000 WORD SPELLING CHECKER

VIP Writer III includes VIP Speller AT NO ADDITIONAL COST! VIP Speller checks text for misspelled words and has a 50,000 word dictionary that can be added to or edited.

QUALITY DOCUMENTATION

VIP Writer III comes with a well written 125 page manual which is Laser printed, not dot-matrix like the competition. It includes a tutorial, glossary of terms and examples for the beginner as well as a complete index! VIP Writer III is truly the BEST you can buy.

Includes VIP Speller 1.1. **DISK $79.95**

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VIP Library

/Writer Database Enhanced

The VIP Library /WDE combines all six popular VIP application programs - VIP Database III, VIP Writer III, VIP Speller, VIP Calc, VIP Terminal and VIP Disk-ZAP - into one program on one disk! The program is called VIP Desktop. From the desktop you have instant access to word processing with a spelling checker always in attendance, data management with mail merge, spreadsheet financial analysis, telecommunications and disk maintenance. * **DISK $169.95**

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VIP Library owners: Upgrade to the VIP Library /WDE for $89.90* + $3 S/H. Send ORIGINAL disk and $92.90 total.

* Future VIP Library upgrades available at reduced cost.

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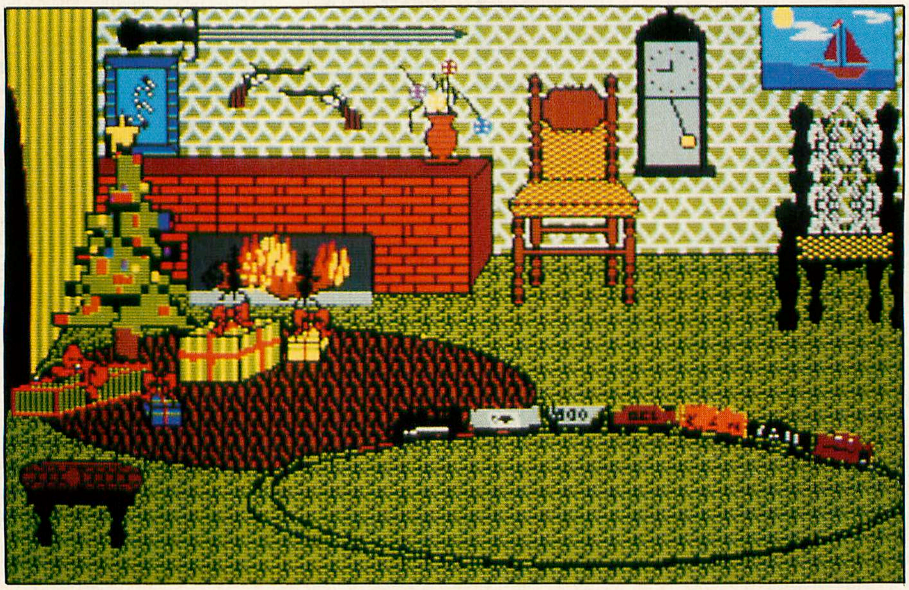
Non VIP Library orders add $3 for shipping and handling in USA. Canada $4. Foreign $6. COD orders add an additional $2.25. Checks allow 3 weeks for delivery. All other orders are shipped the same day.

Telewriter 128 is a trademark of Cognitec. Word Power 3 is a trademark of Microcom Software.

CoCo Gallery

1st

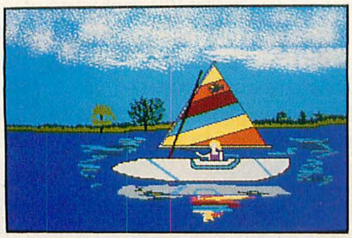
CoCo 3



Xmas Time **Howard C. Rouse**

Howard created this cheerful holiday scene, complete with tree and presents, with *CoCo Max III*. Howard, whose home is in Ocala, Florida, has been using his CoCo 2 and 3 for three years.

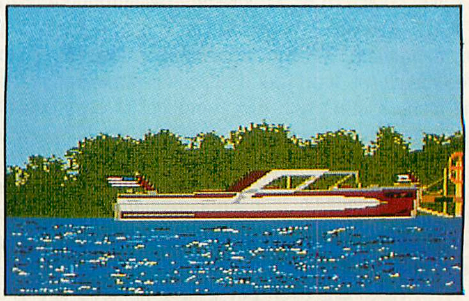
Honorable Mention



Sun Fun **Jerry Suchman**

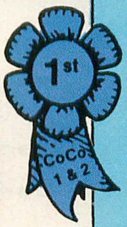
Jerry, from Manchester, Missouri, wants us to remember warm summer days at the beach. He used *CoCo Max III* to create this bright reminder of summer fun.

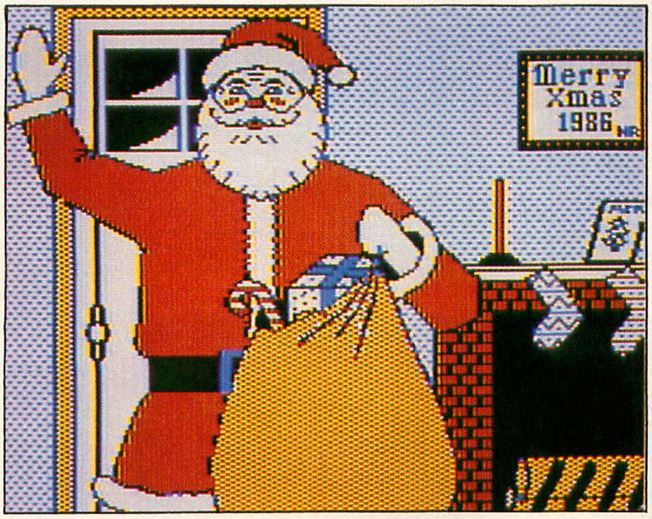
3rd



Dad's #1 Toy **Chris Holcomb**

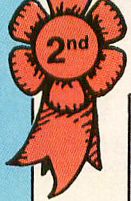
What do you want for Christmas? Chris used *CoCo Max III* to create this illustration of his father's favorite toy. Chris lives in Syracuse, New York, and enjoys Adventure games.

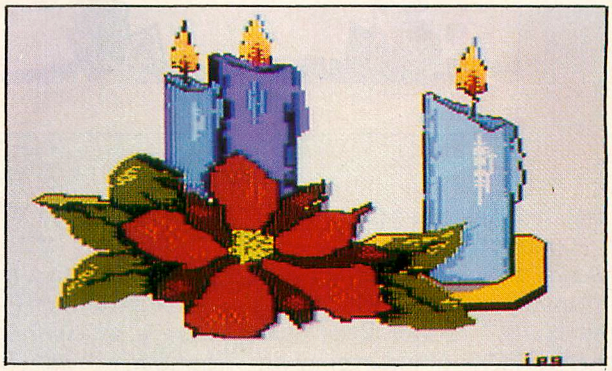




Santa **Nick Ryall**

Have you been naughty or nice? Nick used *CoCo Max* for this Christmas graphic and sends holiday greetings from Halifax County, Nova Scotia.





Candles **Joyce Gerald**

Joyce used *Deskmate 3* to create this graphic of a candle arrangement. Joyce enjoys working with her CoCo 3 and OS-9 so much that CoCo often comes along when she and her husband travel.

SHOWCASE YOUR BEST! You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award two first prizes of $25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of $15 and one third prize of $10. Honorable Mentions may also be given.

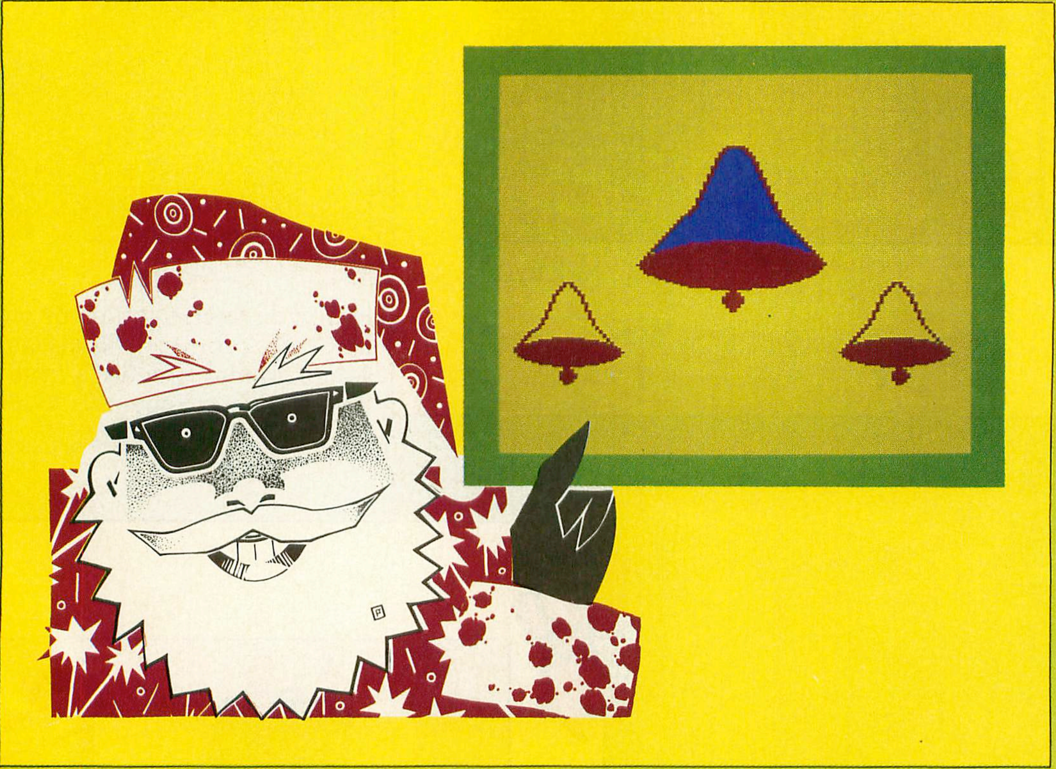
Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

— Angela Kapfhammer, Curator

Liven up those old melodies to have a hip Christmas and a lively New Year

Have a Jazzy Christmas

By Val Burke



The holiday season is upon us. For the next month, we will feast, give gifts and be merry. We will also sing (or listen to) such holiday songs as "Deck the Halls," "Jingle Bells" and "Joy to the World" over and over again.

Don't get me wrong. These are delightful songs, but even the most devoted carol fan can grow tired of hearing the same song sung the same way every Christmas season. I wanted to give some of these old favorites new life.

Jazz musicians have used the word "hip" for more than 40 years — it means sophisticated, fashionable, aware. These musicians have been rearranging music — making it hip — for a long time. *Hipmas* does the same for some of my holiday favorites.

The program offers four musical selections, each with its own graphics. At the start of the program, you are presented with a menu that asks you to press a number (one through four) to hear a musical selection. The menu options will play the following songs:

Option	Song
1	"White Christmas"
2	"Jingle Bells"
3	"We Wish You a Merry Christmas"
4	"Joy to the World"

Once you have you have made your musical selection, the screen will change. A Christmas scene will be drawn, and the music will begin. At the end of the song, you will be returned to the menu and asked for your next selection. (Option 4 has a holiday surprise, but I'll let you see that for yourself.)

This holiday season, let CoCo help in the celebration, and let *Hipmas* supply Christmas entertainment for both family and friends.

(Questions or comments about the program may be directed to the author at P.O. Box 86, Red Oak, GA 30272. Please include an SASE when requesting a reply.) ☐

Val Burke, a professional musician who owns a CoCo 2 and lives in Red Oak, Georgia, enjoys writing computer programs in his spare time.

Telewriter-128™

the Color Computer 3 Word Processor

TELEWRITER: UNDISPUTED #1

If you've read the other word processor ads, you've probably had your fill of cold lists of features, and claims of ultimate speed, power, and ease of use. So let's try to get past the overblown claims and empty buzz words—with 2 *simple facts:*

Fact 1: Telewriter is undisputedly the #1 most popular word processor on the Tandy Color Computers.

Fact 2: Telewriter's exemplary ease of use and power have been acclaimed in numerous magazine reviews and in thousands of letters and calls from end users.

THE OTHERS DON'T UNDERSTAND

So why has Telewriter gained such a large and loyal following, while other Color Computer word processors have come and gone? Ironically, our competitors' ads tell you *exactly* why.

For them, word processing is nothing more than features and numbers. The longer the list of features, and the bigger the numbers, the better the word processor. Or so they think.

They just don't understand that power and ease of use are not gained by tacking on random features or throwing in freebie utilities or forcing you to use a cumbersome mouse.

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Rainbow magazine put it this way: "Telewriter-128 will set the word processing standard for the Color Computer 3 because it is so simple and user friendly. . . . The 81-page tutorial/user's manual is nicely done. It is written in easy to understand language but the program itself is so easy. . . . Most people will be able to use the software right out of the package."

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Desktop publishing is nice for adding pictures and fancy fonts to newsletters or business presentations—but its graphics orientation sacrifices some important capabilities when it comes to working with words.

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COGNITEC
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(Add $2 S&H. Californians add 6% tax. To upgrade from TW-64 to TW-128 send original TW-64 disk and $41.95.)

Telewriter is also available through your nearby Radio Shack Computer Center and participating Radio Shack stores and dealers—or order direct from Express Order by dialing **1-800-321-3133.**

Ask for: **Telewriter-128** (disk) . . . cat #90-0909
Telewriter-64 (disk) . . . . cat #90-0254
Telewriter-64 (cass) . . . . cat #90-0253

FEATURES THAT MATTER: Telewriter's outstanding design and its complete set of features, put it in a class by itself, for smooth, efficient writing and letter perfect printed documents. Telewriter-128 includes:

Unbeatable SCREEN PERFORMANCE: lightning fast paging and scrolling, on-screen text that never lags behind your typing, and a response that is always instantaneous, no matter how much text is in the buffer, or where you are in the document.

26 User definable MACRO KEYS type your often used phrases and titles with a single keypress—saving you time and freeing your concentration for writing. User settable DUAL SPEED CURSOR moves you anywhere on the line, on the page, or in the document, fast or slow—you decide, with the touch of a finger. Fast PRINT PREVIEW MODE shows you text as it will print: headers, footers, margins, page breaks, page numbers, justification—saves time and paper and guarantees perfect looking documents everytime.

Instant, ON-LINE HELP summarizes all Telewriter-128 commands and special symbols. The Online OPTIONS MENU lets you instantly customize the writing environment at any time to suit your precise needs (Screen/character color, Monochrome on/off, Key repeat/delay rate, 2 Cursor repeat/delay rates, Case-sensitivity of search, Auto file backup on/off, and more). A SINGLE FUNCTION KEY takes you instantly to any menu, so you never have to stop and think.

The 24, 25 or 28 LINE SCREEN DISPLAY option lets you see 16% more on-screen text (28), or wider line spacing (25). The auto-loading OPTIONS FILE stores all your Macros, Print Format settings, and Options Menu settings, so they are always there everytime you run Telewriter-128. 3 pop-up STATUS WINDOWS tell you cursor position, word count, free space, etc.

The QUICK SAVE feature lets you instantly save your current document with just 2 keystrokes and without leaving the editor. CURSOR THROUGH DIRECTORY to Load, Append, Rename and Kill files—so you'll never type a filename after the first time. HANGING INDENTS help you organize ideas on the page more effectively. Also: Footers, Multiple Print, Print to Disk, Key Click, Key Repeat, 40/80 Column Option, Overstrike, Word Delete, Nested Macros, Definable Foreign and Math Symbols and more. . . .

And, of course, Telewriter-128 incorporates all the Features of TELEWRITER-64, like: Works with *absolutely any printer* that works with your Color Computer (1, 2, or 3). Uses simple Embedded Control Codes so *all* intelligent features of your printer are easily accessed, including: Underlining, Boldface, variable Fonts, Sub-script, Super-script, Italics etc.

Format commands allow dynamically changing Margins, Headers, Spacing, Centering, etc., anywhere in the document. Format menu sets Margins, Spacing, Page numbering, Baud rate, Lines per page, Justification. Chain Printing means the size of your printed document is unlimited. Also Single page and Partial Print.

Fast full-screen editor with wordwrap, text alignment, block copy/move/delete, global search and replace, wild card search, fast 4-way auto-repeat cursor, fast scrolling, forward and backward paging, settable tabs, word and line counter, full error protection. Insert or delete anywhere on screen. Simple, easy to remember, "mnemonic" Editor Commands. Load, Save, Append, Partial Save files to disk or cassette. Kill, rename and list disk files. ASCII file compatibility.

170	214	3080	221
1030	86	4040	26
1231	166	4220	198
2050	220	4300	48
2200	160	END	163

The listing: HIPMAS

```
10 FORL=1TO20:CLS5:CLS0:CLS5:CLS
0:CLS5:CLS7:NEXTL:PLAY"T2O4L8.A-
L16G-L8FL8E-L8D-L8E-L8FL8D-"
20 FORX=1TO7
30 CLS4:CLS0:CLS4:CLS0:PLAY"T80O
5L16D-O4L16G-L16FL16D-"
40 NEXTX
50 PMODE3,1:PCLS2:SCREEN1,0
60 DRAW"BM88,36D20R8U20L8BR16D8R
8D12R8U12R8U8L22BR30D8R4D4R2U12L
6BR36L22D8F4L4D8R22U6H6R6U8"
70 DRAW"BM2,84D20R22U8L14U6R14U8
L22D2BU2BR30D22R8U8R10D8R8U22L8D
8L10U8L8BR34D22R8U8F8R8U4H9R8U9L
22BR30D22R8U22L8BR36L22D9F4L4D9R
22U7H6R6U8BU1BR8D9R8D13R8U13R8U9
L24BR30D22R8U8F5E5D8R8U22L8G5H5L
8BR32D22R8U8R6D8R8U22L22BR7BD5D4
R6U4L6"
80 DRAW"BM230,82D9F4L4D9R22U8H5R
6U9L22"
90 PAINT(90,38),4,4
100 PAINT(124,39),4,4
110 PAINT(140,39),4,4
120 PAINT(164,39),4,4
130 PAINT(8,88),4,4
140 PAINT(36,88),4,4
150 PAINT(80,88),4,4
160 PAINT(102,88),4,4
170 PAINT(128,88),4,4
180 PAINT(160,88),4,4
190 PAINT(190,88),4,4
200 PAINT(218,88),4,4
210 PAINT(250,88),4,4
220 FORP=1TO2000:NEXTP
230 CLS8:PRINT@41,"hip xmas song
s";:PRINT@106,"for a merry";:PRI
NT@169,"*** HIPMAS ***";:PRINT@2
39,"by";:PRINT@268,"VAL BURKE";:
PRINT@324,"press <1> <2> <3> or
<4>";
231 I$=INKEY$:IFI$=""THEN231
232 IFI$="1"THEN1000
233 IFI$="2"THEN2000
234 IFI$="3"THEN3000
235 IFI$="4"THEN4000
236 IFI$<>"1"ORI$<>"2"ORI$<>"3"O
RI$<>"4"THENSOUND200,5:PRINT@384
,"<1> thru <4> ONLY.";:PRINT@416
,"press <BREAK> TYPE <RUN>&<ENTE
R>"
250 GOTO250
1000 PMODE4,1:PCLS:SCREEN1,1
1010 DRAW"BM128,4G20R12G30R12G50
R70D20R8U20R70H50R12H30R12H20"
1020 PAINT(128,72),5,5
1030 DRAW"BM 0,148E16R8D4F8R4E20
R20E8R4F10R4E16R42F50R10F4R20F16
"
1040 PAINT(2,172),5,5
1050 FORS=1TO1200:NEXTS
1060 FORP=1TO3
1070 CIRCLE(24,12),3
1080 CIRCLE(36,32),3
1090 CIRCLE(56,24),2
1100 CIRCLE(96,6),1
1110 CIRCLE(176,30),3
1120 CIRCLE(200,20),3
1130 CIRCLE(228,16),2
1140 LINE(244,4)-(244,5),PSET
1150 LINE(252,8)-(252,9),PSET
1160 FORNS=1TO800:NEXTNS:PCLS
1170 NEXTP
1180 DRAW"BM128,4G20R12G30R12G50
R70D20R8U20R70H50R12H30R12H20"
1190 PAINT(128,72),5,5
1200 DRAW"BM12,12D12BU12R2F4R2E4
R2D12BR8U12R8BL8BD6R8BL8BD6R8BR8
U12R8D6L8F6BR10U12R8D6L6F6BR10BU
12F4D8BU8E4"
1210 DRAW"BM176,12F12BU12G12BR20
U12R2F4R2E4R2D12BR8U12R8D6L8BR8D
6BR8BU12BR8L8D6R8D6L8"
1220 FORB=1TO100:NEXTB
1230 PLAY"O2T2L8E-O1P8L8B-O2P16P
32L16E-P16L16E-L16DP16L16CO1P16L
16B-"
1231 PLAY"P16O2T2L4L8GP4P8L8G+L8
GL16.G-L16GP16L2G+P16L16.AL16A+P
16O1L16B-P16L16B-L16AP16L8A-P16P
32O3L16CL16.DL16D+P16L64DL64E-L6
4EL8.FL32.E-L32.DL32.E-L32.DL32.
CL32.DL32.CO2L8.B-"
1232 PLAY"O1P16P32L8B-O2P8L16E-L
16L16E-L16DP16L16CO1P16L16B-P16O
4T2L16B-L16A-L16GL16FL16E-L16DL1
6CO3L16B-L16A-L16GL16FL16E-L16FL
16GL16A-L16B-O4L16CL16DL16E-L16F
L16GL16G+L16GL16E-L8B-L32.G-L32.
E-O3L32.BO4L16.B-L16A-"
1233 PLAY"P16P32O4T2L8.GL16GL16G
L16.GP64L16G+P16L16.GP16L16FP16L
16.E-L4.FP8P32L4B-V25L64AL64A-L6
4GL64G-L64FL64EL64E-L64DL64D-L64
```

```
CV15"
1240 FORB=1TO200:NEXTB:GOTO230
2000 PMODE3,1:PCLS:SCREEN1,0
2010 CIRCLE(128,96),50,,.25
2020 DRAW"BM78,96E25U2R1U2R1U2R1
U2R1U2R1U2R1U2R1U2R1U2R1U2R1U2R1
U2R1U2R1U2R1U1R1U1R1U1R1U1R1U1R1
U1R9D1R1D1R1D1R1D1R1D2R1D2R1D2R1
D2R1D2R1D2R1D2R1D2R1D2R1D2R1D2R1
D2R1D2R2D2R2D2"
2030 DRAW"BM178,96H25"
2040 DRAW"BM129,96D13F4D2G4L2H4U
2E4"
2050 PAINT(126,94),4,4
2060 PAINT(126,110),4,4
2070 PAINT(124,56),3,4
2080 CIRCLE(40,140),30,,.25
2090 DRAW"BM12,140E15U2R1U2R1U2R
1U2R1U2R1U2R1U2R1U1R1U1R1U1R1U1R
1U1R1U1R3D1R1D1R1D1R1D1R1D1R1D1R
1D2R1D2R1D2R1D2R1D2R1D2R1D2R1D1R
1D1R1D1R1D1R1D1R1D1R1D1R1D1R1D1R
1D1R1D1R1BL26BD2D10F3D2G3L2H3U2E
3"
2100 PAINT(40,116),2,4
2110 PAINT(38,138),4,4
2120 PAINT(38,150),4,4
2130 CIRCLE(216,140),30,,.25
2140 DRAW"BM188,140E15U2R1U2R1U2
R1U2R1U2R1U2R1U2R1U1R1U1R1U1R1U1
R1U1R1U1R3D1R1D1R1D1R1D1R1D1R1D1
R1D2R1D2R1D2R1D2R1D2R1D2R1D2R1D1
R1D1R1D1R1D1R1R1R1D1R1D1R1D1R1D1
R1D1R1D1R1D1R1D1R1D1R1D1R1BL29BD
2D7F3D2G3L2H3U2E3"
2150 PAINT(220,116),2,4
2160 PAINT(220,140),4,4
2170 PAINT(216,150),4,4
2180 FORP=1TO500:NEXTP:PAINT(4,4
),2,4
2190 PLAY"T3O1L16DL4GL4FL4EL4A+L
4AL4D+L4DP4O3L8BP8L8BP8L4BP4L8BP
8L8BP8L4BP4L8BP8O4L8DO3P8L8GP8L8
AP8L2BP2O4L9CL9DL9CO3L9BL9AL9GL9
F+L9DL64B-L8BP9L64B-L8BL8AL8GP9L
16BP8L16BL16BP8L8AP8L8AP8L8BL2AO
4L2D"
2200 PLAY"T3O3L64B-L8BP9L64B-L8B
P9L64B-L4BP4L64B-L9BP8L64B-L8BP9
L64B-L4BP4L8BP8O4L8DO3P8L8GP8L8A
P8L2BP2O2L9AL9BO3L9CL9DL9EL9F+L9
GL9AL9BO4L8CL8DL8EL8FL8EL8DO3L8B
O4L8DP9L8DP9L8CO3P9L8AL2G"
2210 GOTO 230
3000 PMODE 3,1:PCLS3:SCREEN 1,0
3010 CIRCLE(128,96),70,,1
3020 CIRCLE(128,96),50,,1
3030 PAINT(128,36),1,4
3040 DRAW"BM100,161U1L2U1L2U1L2U
1L2U1L2U1L2U1L3U1L3U1L3U1L3U1L3U
```

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```
1L3U1L3U1L3U1D42U1R3U1R3U1R3U1R3
U1R3U1R3U1R3U1R3U1R3U1R3U1R3U1R4
U1R4U1R4U1R4U1R4U1R4D4F3R8E3U4R3
D1R3D1R3D1R3D1R3D1R3D1R3D1R3D1R3
D1R3D1R3D1"
3050 DRAW"BM166,182R3D1R3D1R3D1R
3D1R3D1R3D1R4D1U42L3D1L3D1L3D1L3
D1L1D1L1D1L1D1L3D1L3D1L3D1L4D1L4
D1"
3060 PAINT(80,168),4,4
3070 DRAW"C2BM34,8D8BU8R4D4L4BR4
D4BR16BU8BR4L4D8R4BR4BU8BR4L4D8R
4U8BR8L4D8R4BR8L4U8R4D8BR20L4U8R
4BR4D8BR4U4L4BR4U4BR4BD8U8R4D4L4
F4BR4U8BR8L4D4R4D4L4BR8BU8R2D8BU
8R2BR4BD8U8F2E2D8BR4U8R4D4L4BR4D
4BR4BU8BR4L4D4R4D4L4"
3080 DRAW"C2BM179,8D8E2F2U8BR4BD
8U8R4D4L4F4BR8L4U4R4BL4U4R4BR4BD
8U8R4D4L4BR4D4BR4BU8R2D8BU8R2BR4
BD8U8BD4R4BU4D8"
3090 FORP=1TO400:NEXT P
3100 PLAY"O1T3L4FO2L9CP78L9DP78L
9CP8O1L4CP78L9AP8L6GP9L4FO2L9CP7
8L9DP78L9CP8O1L4CP78L9AP8L6GO4L9
CL9FP8L9FL9GL9FL9EL9DP7L9DP4L9DL
9GP7L9GL9AL9GL9FL9EP8L9CP4L9CL9A
P8L9AL9B-L9AL9GL9FP8L9DP8L9CL9CL
9DP8L9GP8L9EP8L4FP2"
3110 PLAY"O1T3L4FO2L9CP78L9DP78L
9CP8O1L4CP78L9AP8L6GP9L4FO2L9CP7
8L9DP78L9CP8O1L4CP78L9AP8L6GO4L9
CL9FL9GL9AL9GL9FL9EL9DL9FO3L9B-O
4L9CL9DL9FL9GL9AL9B-L9AL9GL9FL9E
L9GL9CL9DL9EL9GO5L9FL9EL9DL9CO4L
9B-L9AL9GL9FL9EL9DL9EL9FL9GL9AL9
B-P8L9EP8L4.F"
3120 FOR P=1TO400:NEXT P:GOTO 23
0
4000 PMODE3,1:PCLS:SCREEN1,0
4010 DRAW"BM33,180U120R190D120L1
90"
4020 CIRCLE(129,180),86,,1.2,.50
,0
4030 PAINT(40,84),4,4
4040 DRAW"BM42,180E20BR130F20BH2
0U8BD8D8L130U16R130BL20U10L90D10
BU6L10D6BR110U6L10BU4BL80H6U2L1U
2L1U3E8U3H6R6D1R1D1R1D1R1F6D3G6D
3L1D1L1D6BR35H10U6E12U4H8R6D1R2F
10D6R1D1R1D1R1D1R1D1R1D1R1D1R1D1
G18BR26H6U3E12U3F4D4G6D1R1D1R1D1
R1G6"
4050 DRAW"BM95,142E4R2D1F2R2E8D4
F4BR16E3R3U3F6"
4060 PAINT(88,136),2,4
4070 PAINT(110,172),3,4
4080 PAINT(110,162),2,4
4090 PAINT(120,150),2,4
4100 PAINT(174,150),2,4
4110 PAINT(78,150),2,4
4120 PAINT(128,130),2,4
4130 PAINT(88,130),2,4
4140 PAINT(99,140),2,4
4150 PAINT(108,140),2,4
4160 PAINT(138,140),2,4
4170 PAINT(150,135),2,4
4180 DRAW"BM124,8G10F25G8D6E22H2
8U2R2D2L2BD17BL4E10"
4190 PAINT(134,32),4,4
4200 PAINT(122,12),3,4
4210 PAINT(248,184),2,4
4220 FORP=1TO100:NEXTP
4230 FORRE=1TO2:PLAY"T3O1L4CP8L8
O2GP64L8GO1P9L7GP9O1L4CP8L8O2GP6
4L8GO1P9L7GP8":NEXTRE
4240 PLAY"T3O4L2CO3L4.BL8AL2GP4L
8FP8L2EL2DL4.CO2L8GP64L8GO1P9L7G
P8O3L2.AP16L8AP9L2.BP16L8BP9O4L4
.CO2L8GP64L8GO1P9L7GP8O2L8C":FOR
 AG=1TO3:PLAY"O2T40L16BL16B-L16A
L16A-L16GL16G-L16FL16EL16E-L16DL
16D-O1L16CL16BL16B-L16AL16A-L16G
L16G-L16FL16EL16E-L16DL16
4250 NEXT AG
4260 CLS6:PRINT@74,"***surprise*
**";:PRINT@138,"press any key";
4270 NY$=INKEY$:IF NY$=""THEN 42
70
4280 PMODE3,1:PCLS7:SCREEN1,1
4290 DRAW"C6BM22,42H16BF8E8BH8F1
6BG8BD8G16BE16F8G8H8BF8G8BD8G8F1
6BH8E8H8BG8BF16BD8G16BE16F8G8H8B
G8BD8BR10F8G8H8BF8E4F8"
4300 DRAW"C8BM40,16D150BU150R5D1
0R5D10R5D10R5D10R5D10R5D10R5D10R
5D10R5D70BU70U80BR16D150R45BL45B
U70R45BL45BU80R45BR16D150R5U10R5
U10R5U10R5U10R5U10BD10R5D10R5D10
R5D10R5D10R5U150"
4310 DRAW"C6BM242,16G8F8E8BG8H4G
8BD8G8F16E8BH8G8BF8BD8G16BE16F8G
8H8BF8G8BD8G8F16BH16BE8F8G8R12BL
12BF8BD8G10BG4G2H2E2F1BF2G2BD8BE
6E10BG14F2G2H3E2F1"
4320 FORP=1 TO 400:NEXT P:FOR X=
1TO 4
4330 PLAY"O1T2L16GL8G+L16AL16A+P
16O2L16B-P8L8.B-"
4340 NEXTX
4350 PLAY"P16O2T2L8B-P16P32O3L2E
-L8DP16P32L4E-P8L4GP8L8FL8GL8E-L
8FL8GL8E-L8FP8L32FL32F+L16GP16L3
2E-L32EL16FP16L32D-L32DL2E-P16L8
E-P16L4GP8L4B-P8T5O4L16CO3L16BO4
L16CO3L16BO4L16CO3L16BO4L16CO3L1
6BO4L16CO3L16BO4L16CO3L16BO4L1C"
4360 PLAY"P2P4T2O4L8E-P4O3L2B-P9
L8GP16L8.GP7L8E-O5P4L4.FP8L8E-L8
FP16O1L4GO3L8GP16L8FO4L2E-L8CP16
L4CO3P8L8B-P4O4L2E-P4O1L2E-"
4370 FORP=1TO400:NEXTP:GOTO230
```

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THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has **a special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $25 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged $3.50 each month for direct billing.

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The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles**, helpful hints and many other useful features.

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THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a $24.95 value — and a free hour of connect time — a $7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this $32.15 value as a ***free bonus!***

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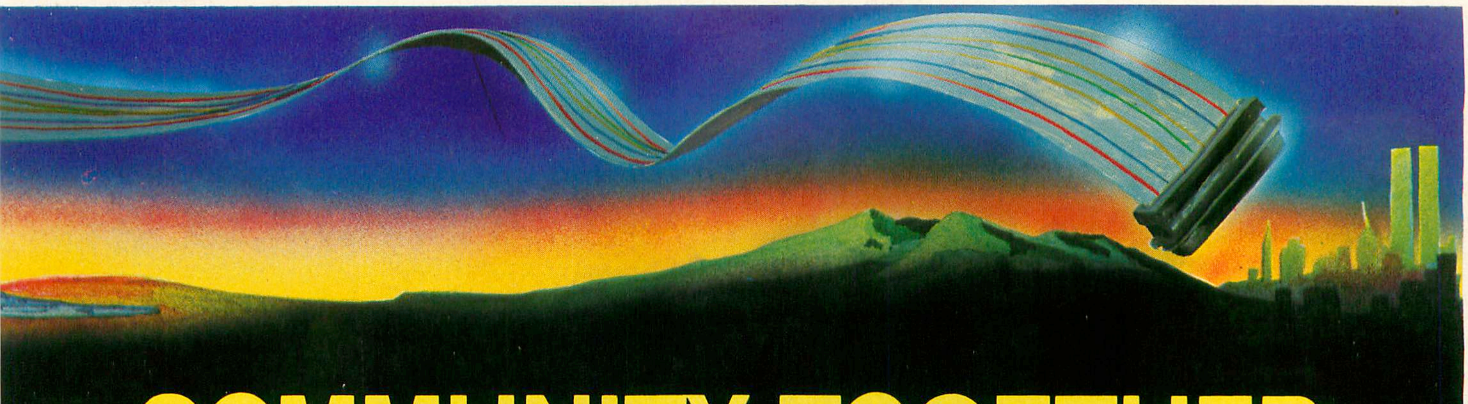
DELPHI

TYPE:
GROUP COCO



COMMUNITY TOGETHER

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional $10.80 (U.S.) per hour.

On Telenet: Uninet network has merged with Telenet. To get the Telenet number for your area, call (800) 336-0437. After you call the local access number and make connection, press ENTER twice. When the "TERMINAL=" prompt appears, press ENTER again. When the "@" prompt appears, type `C DELPHI` and press ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type `DELPHI` and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type `SET 2:1, 3:126` and press ENTER. Now type `p 1 3106, DELPHI;` and press ENTER. Delphi's new rates indicate an additional $10.80 hourly surcharge for evening use of Datapac, which means a total of $18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 3110 6170 3088 through Telenet, or 3106 90 6015 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `RAINBOW`. Then, at the "NUMBER:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `SENDRAINBOW` and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just use Control-X and start over. Remember that at any point, when you're on Delphi, you can type `HELP` to get help on how to use the system. To get off the system just type `BYE`.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

Come Visit Us! Type: `GROUP COCO`

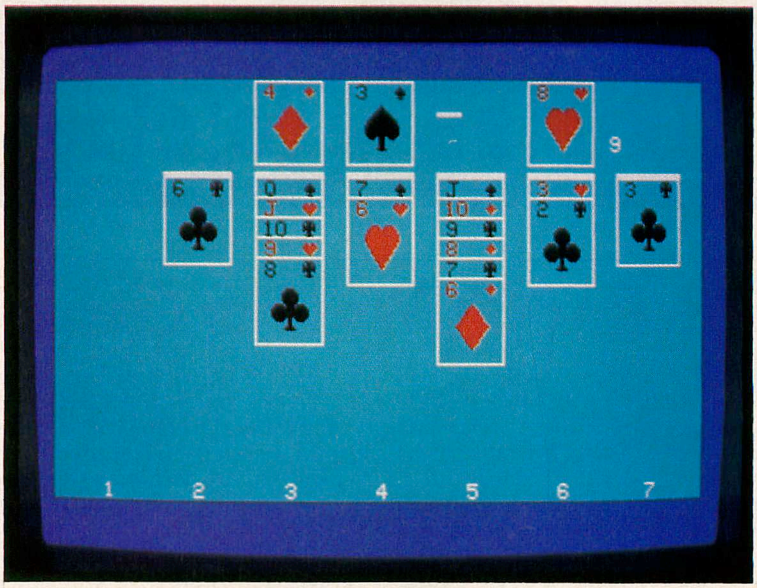
After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is verified and opened, *each RAINBOW subscriber will be credited with an hour of free time!*

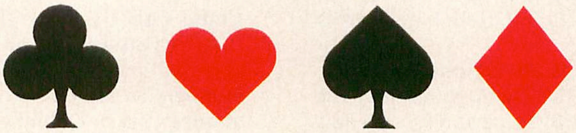
When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in `GROUP COCO` and **join us on the CoCo SIG!**

Adding color to Solitaire on the CoCo 3



Solitaire, the Next Generation



By George Quellhorst

Ever since *Solitaire* first entered our house in December of 1986, it has been a favorite with the whole family. And judging by the various additions and alterations that have been published in THE RAINBOW since then, it must be a favorite with many others as well.

You can easily imagine our dismay when we purchased a brand-new Color Computer 3 and discovered that we had to be satisfied with playing our favorite game in black-and-white. It was as though we were forced backward into the Stone Age of computing!

After many sleepless nights and lots of complaining, my 18-year-old son and I put our minds into the programming mode, turned on the computer and set out to convert this game so it could accommodate the Hi-Res graphics screen of the CoCo 3.

Thanks to the many `REM` statements in Tudor P. Jones' listing, the unravelling of his program was a rather easy task. We used the program published in the December 1986 issue of THE RAIN-

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George Quellhorst lives in Painesville, Ohio, and has had a CoCo since the 4K days. He enjoys writing programs on his two CoCo 2s and a CoCo 3 with RGB monitor.

BOW ("The Solitary Endeavor," Page 76) and added the "automatic finish" provided by Vincent Johnson in the January 1988 issue ("*Solitaire* Upgrade — Automatic Finish," Page 171).

Solitaire 3 is written to work with an RGB monitor. For those of you who have a composite monitor, the following changes will have to be made in the program: In Line 5, change the `RGB` to `CMP` and the `PALETTE 2,28` command to `PALETTE 2,10`; in lines 30 and 136, change the `POKE65434,8` to `POKE 65434,10`.

You could also replace the 2 with an 11 in those three lines, although both result in a blue background. A 10 will give you a slightly darker color. `POKE65434` is what I call the "Border Poke." More about this later.

The only addition we made to the regular program (and not possible on a CoCo 2) is an `ON BRK GOTO` command. Because the BREAK key is so close to the up arrow key on the CoCo 3, it is pressed by mistake many a time in the heat of a game. On a CoCo 2, it is an easy matter to type `SCREEN1,0:CONT` and save the game. The CoCo 3, however, does an automatic `HCLS` every time you use the `HSCREEN` command. All is not lost, though, as poking a value of 51 into Address 59078 will cancel the automatic `HCLS`. The `ON BRK GOTO` statement in Line 5 routes the program to Line 135 every time the BREAK key is pressed. Line 136 pokes the correct value into Address 59078, cancels the automatic `HCLS`, gives an `HSCREEN2` command and routes the program to a convenient `INKEY` statement. The original value of 141 is "poked" back into this location in Line 30 to guarantee that the `HSCREEN` is cleared at the start of a new game and also when Q is pressed.

The rules are straight from Hoyle, and the title screen displays complete instructions on how to play each time you start a new game. Those who are new to this computer version of solitaire will find it very easy to play. The game is controlled entirely by the four arrow keys, the numbers 1 through 7, the letter Q and the space bar.

In the usual fashion, the cards are dealt and displayed in seven rows, each stack or row containing an amount of cards that corresponds to its row number. Simply put, the first row contains one card, the second row holds two, the third row holds three, etc. The last card in each row is dealt face up.

The four aces will be placed above the first four columns of cards. The leftover cards are placed in a stack directly above the sixth row; three of those will be on display at a time and can be accessed by pressing the space bar. A small display above the fifth row assists you in playing the game. The object of solitaire is to return all cards to the top four rows in ascending order starting with the aces.

The up arrow and a number (1 to 7) are used to move cards from a bottom row to one of the top stacks. The down arrow in conjunction with a number (1 to 7) is used to move a card from the display to one of the bottom seven rows. The rows must be built in descending order and alternating colors (a heart or a diamond on a club or a spade). The left arrow will move an ace or other card from the display stack to the corresponding stack on the top row. An ace should be moved up as soon as it becomes available. The right arrow is used in conjunction with two numbers (1 to 7) to move a card or cards from one row to another.

Any illegal move will cause a "no" message to be displayed above the fifth row of cards. A double line on the top of a card indicates that there are still unexposed cards underneath that particular card.

Once a row is completely cleared out, leaving an empty space, it can be filled only by bringing down a king or by moving a row of cards that is built on a king. A whole stack of cards or even part of a stack can be moved from one pile to the next providing the descending/alternating rule is followed. The game is won when all the cards in the bottom rows have been placed in the proper order on top of the four aces.

How to Cheat

It stands to reason that not all games can be won. That is where the letter Q comes in handy. It stands for "quit." Pressing Q will clear the screen and route the program back to the title screen.

Those of you who love to cheat (and maybe win a couple more games) can make a few changes in the program that will allow you to bring down any card to an empty space and also to move a row or part of a row to another even if that row is not built on a king: In the beginning of Line 75, remove the `RA=13 AND` so that the line reads `IF CO(F,1)=0 THEN`, etc.; in Line 120, remove the `23ELSE118` at the end and replace it with `I=I+1:GOTO121ELSE 118`. Of course, you're not playing in accordance with the rules of the game, but this does make winning a little bit easier. Be careful, though; this game is very addictive.

Make a Run for the Border Poke

Shortly after my son and I converted this game to run on the CoCo 3, I purchased OS-9 Level II and discovered that it has a border command, allowing one to "paint" a colored border around any one of the five `HSCREEN`s. Ever since I got a CoCo 3, that ugly black border around my beautiful Hi-Res graphics screen has bothered me no end. Although I consider myself a good BASIC programmer, when it comes to machine language or the inner workings of those "little black chips" inside the computer, I am kind of lost. Still, I wondered why OS-9 could have a border command if Super Extended BASIC could not. The GIME chip obviously was able to color the border. After all, it does so under OS-9.

Well, to make a long story short, I obtained a copy of the GIME chip's specifications and started looking into this matter. The first thing I discovered was that the chip does indeed have a border register — a place in memory — that controls the color of the border around the `HSCREEN`s. The second discovery was that all the values in this register or address are set to zero or black, in order to make the CoCo 3 backward-compatible with earlier CoCos.

A little experimentation soon revealed that poking a value other than zero into this location, &HFF9A or 65434 decimal, does indeed result in a colored border around the Hi-Res graphics screens, including the two text screens. The only drawback is that for some reason this poke does not work in the immediate mode — you can't directly type `WIDTH80:POKE65434,8` and expect a colored border. This poke works only within a running program. You may poke any value between 0 and 63 into this address. However, pressing BREAK or the reset button will reset this value back to 0, or black. And Hi-Res text screens, when used, are reset to the last `CLS` command. Therefore, in Line 136 of this program, the BREAK interrupt, it is necessary to re-poke the border color (`HSCREEN2:POKE 65434,8`). ☐

(Questions or comments about this program may be directed to the author at 63 South State St., Painesville, OH 44077. Please enclose an SASE when writing for a reply.)

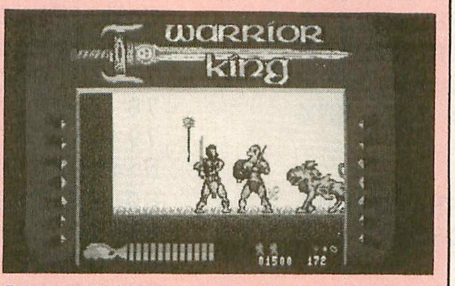
14	64	90	11
23	73	111	96
28	219	126	97
37	28	134	121
52	252	END	56
74	78		

The listing: SOLTAIR3

```
5 CLEAR:RGB:HSCREEN0:WIDTH40:ONB
RKGOTO135:POKE&HF80F,0:POKE&HF84
F,0:POKE&HF89C,0:PALETTE0,0:PALE
TTE2,28:HCOLOR4,2:CLS3:POKE65497
,0:DIMDE(52),CO(7,20),C$(4),S$(4
),N$(14),YC(7),ST(4):R=RND(-TIME
R):GOSUB130:GOTO24
6 N$=INKEY$:IF N$=""THEN6ELSERET
URN
7 HLINE(272,9)-(286,32),PRESET,B
F:N1=INT(D/10):N2=D-N1*10:IF N2=
1THEN N2=14
8 IF N1=1THEN N1=14
9 IF N1=0THEN10ELSEHDRAW"BM272,3
2;XN$(N1);BR4XN$(N2);":RETURN
10 HDRAW"BM272,32;XN$(N2);":RETU
RN
11 IF CA<14THEN RA=CA:SU=1:RETUR
N
12 IF CA<27THEN RA=CA-13:SU=2:RE
TURN
13 IF CA<40THEN RA=CA-26:SU=3:RE
TURN
14 RA=CA-39:SU=4:RETURN
15 HLINE(XC,YC)-(XC+11,YC+1),PSE
T,B:RETURN
16 HLINE(231,0)-(263,39),PRESET,
BF:RETURN
17 HLINE(XC,YC)-(XC+32,YC+39),PR
ESET,BF:RETURN
18 IFSU=1ORSU=3THENHLINE(XC,YC)-
(XC+32,YC+39),PSET,B:HCOLOR3,2:H
DRAW"BM"+STR$(XC+5)+","+STR$(YC+
8)+"XN$(RA);":HDRAW"BM"+STR$(XC+
24)+","+STR$(YC+8)+"XS$(SU);":HD
RAW"BM"+STR$(XC+17)+","+STR$(YC+
32)+"XC$(SU);":HCOLOR4,2:HPAINT(
XC+11,YC+22),3,3
19 IFSU=2ORSU=4THENHLINE(XC,YC)-
(XC+32,YC+39),PSET,B:HCOLOR12,2:
HDRAW"BM"+STR$(XC+5)+","+STR$(YC
+8)+"XN$(RA);":HDRAW"BM"+STR$(XC
+24)+","+STR$(YC+8)+"XS$(SU);":H
DRAW"BM"+STR$(XC+17)+","+STR$(YC
+32)+"XC$(SU);":HCOLOR4,2:HPAINT
(XC+11,YC+22),12,12
20 RETURN
21 IF CO(F,1)=0 ORCO(F,2)=0THEN2
2ELSERETURN
22 HLINE(XC,43)-(XC+32,44),PRESE
T,B:RETURN
23 XC=186:YC=1:GOSUB17:HDRAW"BM1
95,20;U6F4D2U6BR5R2FD4GL2HU4E":F
ORN=1TO500:NEXT:GOSUB17:GOTO34
24 LOCATE11,0:ATTR3,2:PRINT"S O
L I T A I R E";:LOCATE11,1:PRINT
"*****************":LOCATE1,4:AT
TR1,2:PRINT"PRESS: - SPACEBAR -"
;:ATTR3,2:LOCATE1,5:PRINT"TO DIS
PLAY YOUR NEXT CARD":LOCATE1,7:A
TTR1,2:PRINT"- DOWN ARROW AND CO
LUMN NUMBER -";:ATTR3,2
25 LOCATE1,8:PRINT"TO MOVE CARDS
 FROM DISPLAY TO COLUMNS":LOCATE
1,10:ATTR1,2:PRINT"- LEFT ARROW
-";:ATTR3,2:LOCATE1,11:PRINT"TO
MOVE CARD FROM DISPLAY TO TOP ST
ACK":LOCATE1,13:ATTR1,2:PRINT"-
UP ARROW AND COLUMN NUMBER -";:A
TTR3,2
26 LOCATE1,14:PRINT"TO MOVE CARD
 FROM COLUMN TO TOP STACK":LOCAT
E1,16:ATTR1,2:PRINT"- RIGHT ARRO
W AND COLUMN NUMBERS -";:ATTR3,2
27 LOCATE1,17:PRINT"TO MOVE CARD
S FROM COLUMN TO COLUMN":LOCATE6
,20:ATTR7,0:PRINT"PRESS [Q] TO Q
UIT AT ANY TIME";:ATTR3,2:LOCATE
3,21:ATTR7,0:PRINT"MOVE ALL CARD
S TO TOP STACK TO WIN";:ATTR3,2:
LOCATE3,23:ATTR3,2,B:PRINT"DECK
BEING SHUFFLED";:ATTR3,2
28 FORI=1TO4:ST(I)=0:NEXT:FORI=1
TO7:YC(I)=45:FORJ=1TO20:CO(I,J)=
0:NEXT:NEXT
29 FORI=1TO52:DE(I)=I:NEXT:FORI=
1TO52:J=RND(52):N=DE(J):DE(J)=DE
(I):DE(I)=N:NEXT:LOCATE3,23:PRIN
T"DECK BEING SHUFFLED";:ATTR3,2,
B:LOCATE25,23:ATTR3,2,B:PRINT"PR
ESS <ENTER>";:ATTR3,2:GOSUB6:ATT
R3,2
30 HSCREEN2:POKE65434,8:HCLS2:HC
OLOR4,2:POKE59078,141
31 HDRAW"BM26,190;XN$(14);":J=26
:FORI=2TO7:J=J+44:HDRAW"BM"+STR$
(J)+",190;XN$(I);":NEXT
32 J=0:K=24:FORI=1TO7:J=J+1:FOR
N=1TO J:K=K+1:CO(I,N)=DE(K):DE(K
)=-1:NEXT:NEXT:XC=-33:YC=45:FORI
=1TO7:CA=CO(I,I):GOSUB11:XC=XC+4
4:GOSUB18:IF I=1THEN NEXT ELSE H
LINE(XC,43)-(XC+32,44),PSET,B:NE
XT
33 CA=DE(3):GOSUB11:XC=231:YC=0:
GOSUB18:D=3:GOSUB7
34 IF DE(1)>0THEN37
35 N=0:FORI=28TO292STEP44:IFHPOI
NT(I,43)=4THEN I=292:N=1
36 NEXT:IF N=0THEN137
37 XC=186:YC=1:GOSUB17:IFST(1)+S
T(2)+ST(3)+ST(4)=52THEN39ELSE XC
=187:YC=15:GOSUB15
38 GOSUB6:IF N$="Q"THEN5ELSEIF N
$=CHR$(32)THEN41ELSEIF N$=CHR$(1
```

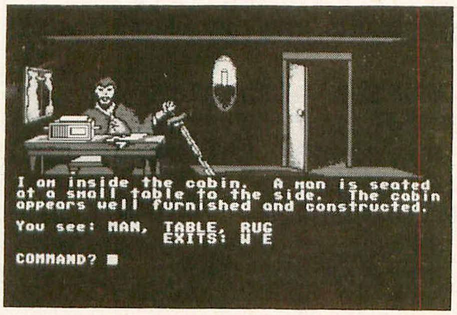
SUNDOG SYSTEMS

Warrior King



Become RASTANN, Warrior King, on the quest to regain his rightful crown, hidden deep within a sinister land. Battle monsters, gain magic and weapons, and travel through harsh wilderness and dark castle dungeons in this medieval realm. From the creator of *Kung-Fu Dude* comes this awesome arcade game for the CoCo III! *Warrior King* uses the most detailed 320x200 16 color graphics and high speed machine code to vault you into a world of fantasy. Dare ye challenge the many perils ahead in order to become WARRIOR KING? Req. 128K CoCo III, disk drive, and joystick. Only $29.95.

In Quest of the Star★Lord



```
I am inside the cabin.  A man is seated
at a small table to the side.  The cabin
appears well furnished and constructed.
You see: MAN, TABLE, RUG
              EXITS: W E
COMMAND? ■
```

This is THE graphic adventure for the CoCo III! Unparalleled 320x200 animated graphics will leave you gasping for more! You quest for the Phoenix Crossbow in this post-holocaust world of science and fantasy. *In Quest of the Star Lord* is a full 4 disk sides of mind-numbing adventure! Req. 128K CoCo III and disk drive. Only $34.95. Hint Sheet: $3.95.

"A dynamite program! The best graphics I've seen to date on the CoCo III. You have to see it to believe it."

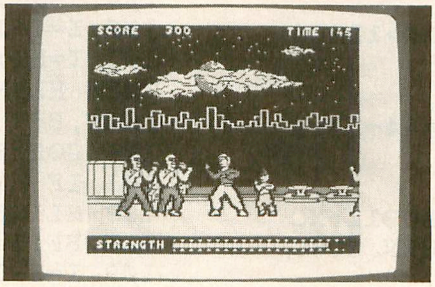
— *8/88 Rainbow review*

Kung-Fu Dude

An exciting arcade game. The BEST karate game ever created for the CoCo! Destroy opponents and evade obstacles as you grow ever closer to your ultimate objective. Spectacular graphics, sound effects, and animation! Req. 64K CoCo, disk drive, and joystick. Only $24.95.

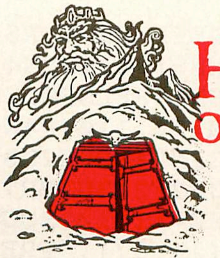
"The CoCo karate gap has been filled and Kung-Fu Dude *does it excellently. I highly recommend it!"*

— *2/88 Rainbow review*



All programs CoCo 1, 2, 3 compatible, unless otherwise stated

HALL of the KING TRILOGY



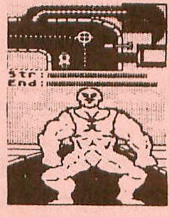
The epic adventure is back! The largest adventure campaign ever seen for the CoCo is again available! A total of six disks of intense graphic adventure will have you playing for weeks! Each section is a two-disk stand alone adventure, but all three together form an epic saga. Quest for the legendary Earthstone in the ancient dwelling of the dwarves while you enjoy the classic graphics that made this trilogy famous! Each adventure can be purchased separately for $29.95, the lowest price ever, or you can purchase the entire set for only $74.95! Req. 64K CoCo and disk drive.

"One of the best adventures I have experienced to date!" — *6/86 Rainbow review*

"The animated graphics are dramatic, detailed, and excellent!" —*11/87 Rainbow review*

"The adventure of a lifetime. Don't miss out!" — *7/88 Gamer's Connection review*

CHAMPION



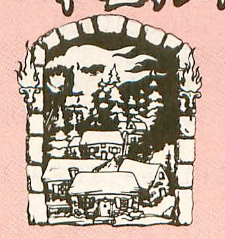
Become a superhero in this unique 64K action adventure. Great graphics and sound effects! See 5/87 Rainbow review. Disk $19.95.

DRAGONBLADE

Another great 64K animated adventure! Can you obtain the enchanted sword to slay the evil dragon? See 11/86 Rainbow review. Disk $19.95.

DRAGONBLADE

WHITE FIRE OF ETERNITY!



Enter the era of monsters and magic in this splendid 64K animated adventure! See 12/86 Rainbow review. Disk $19.95.

Sundog Systems
21 Edinburg Drive
Pittsburgh, PA 15235
(412) 372-5674

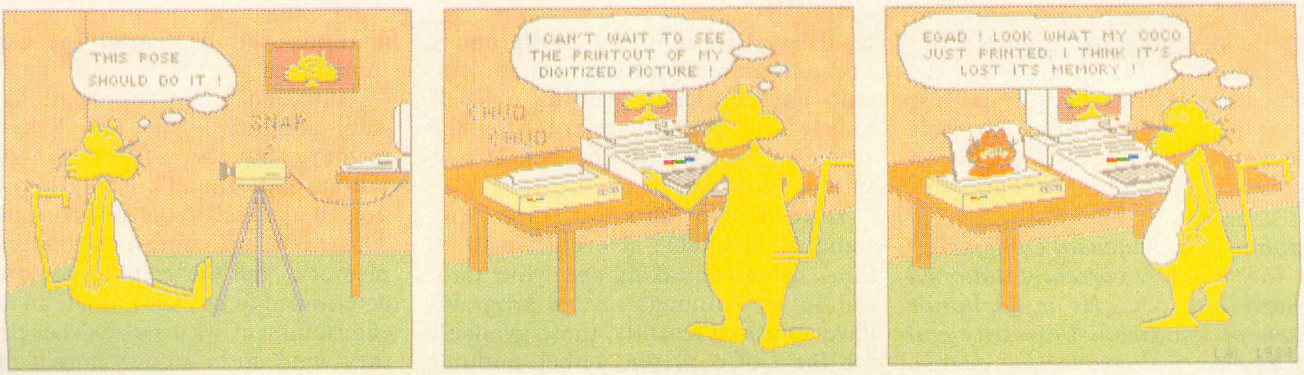
Personal checks, money orders, and American C.O.D. orders accepted. Include $2.50 for S/H. $3.00 extra for C.O.D. orders. PA residents add 6% sales tax. Authorship and dealer inquires welcome.

```
0)THEN62ELSEIF N$=CHR$(9)THEN85E
LSEIF N$=CHR$(94)THEN48ELSEIF N$
=CHR$(8)THEN128ELSEGOTO38
39 HDRAW"BM122,110;F4NE4D6BR10H2
U6E2R4F2D6G2NL4BR9H2U8BR8D8G2NL3
BR3BE10D7F3E2F2E3U7BR7D10BR7U10F
8D2U10":FORZ=1TO10:SOUND180,1:NE
XTZ:HPRINT(14,17),"PRESS ANY KEY
":GOSUB6:RUN
40 ' Start of spacebar.
41 HDRAW"BM188,13;E4NL4NH4NU4NE4
NR4NF4D4":XC=231:YC=0:GOSUB17
42 IF DE(1)=-1THEN23
43 D=D+3:IF DE(D)>0THEN46
44 D=D-1:IF DE(D)>0THEN46
45 D=D-1:IF DE(D)<0THEN D=0:XC=2
31:YC=0:GOSUB17:GOTO42
46 CA=DE(D):GOSUB11:XC=231:YC=0:
GOSUB18:GOSUB7:GOTO34
47 ' Start of up-arrow
48 HDRAW"BM191,13;U5L2E4F4L2D5L4
":XC=204:YC=15:GOSUB15
49 GOSUB6:IF N$="Q"THEN34ELSEIF
N$<"1"OR N$>"7"THEN49
50 F=VAL(N$):IF COL(F,1)=0THEN23
51 IF F=1THEN F=14
52 I=20:HDRAW"BM207,13;XN$(F);":
IF F=14THEN F=1
53 I=I-1:IF CO(F,I)=0THEN53ELSE
CA=CO(F,I):GOSUB11
54 IF RA<>ST(SU)+1THEN23
55 ST(SU)=ST(SU)+1:XC=SU*44-33:Y
C=0:GOSUB17:GOSUB18
56 XC=F*44-33:YC=YC(F):GOSUB17
57 CO(F,I)=0:IF YC(F)>45THEN YC(
F)=YC(F)-9
58 GOSUB21
59 IF CO(F,1)=0THEN YC=45:GOSUB1
7:GOTO34
60 CA=CO(F,I-1):GOSUB11:YC=YC(F)
:GOSUB18:GOTO34
61 ' Start of down-arrow.
62 HDRAW"BM193,13;H4R2U5R4D5R2G4
":IF DECK(1)=-1THEN23
63 CA=DE(D):GOSUB11:IF RA<>1THEN
70
64 GOSUB 16
65 ST(SU)=ST(SU)+1:XC=SU*44-33:Y
C=0:GOSUB17:GOSUB18
66 IF D=0THEN46
67 I=D:D=D-1:CA=DE(D):GOSUB11:XC
=231:YC=0:GOSUB7:IF D>0THEN GOSU
B18
68 IF DE(I+1)=-1THEN DE(I)=-1:GO
TO34
69 DE(I)=DE(I+1):I=I+1:GOTO68
70 XC=204:YC=15:GOSUB15
71 GOSUB6:IF N$="Q"THEN34ELSEIF
N$<"1"OR N$>"7"THEN71
72 F=VAL(N$):IF F=1THEN F=14
73 HDRAW"BM207,13;XN$(F);":IF F=
14THEN F=1
74 IF RA=13AND CO(F,1)<>0THEN23
75 IF RA=13 AND CO(F,1)=0THEN GO
SUB16:CO(F,1)=DE(D):XC=F*44-33:Y
C=YC(F):GOSUB18:GOTO66
76 C1=RA:S1=SU:I=20
77 IF CO(F,1)=0THEN23
78 I=I-1:IF CO(F,I)=0THEN78
79 CA=CO(F,I):GOSUB11:N=SU+2:IF
N>4THEN N=N-4
80 IF N=S1 OR SU=S1 THEN 23
81 IF C1<>RA-1 THEN 23
82 GOSUB16
83 YC(F)=YC(F)+9:XC=F*44-33:YC=Y
C(F):GOSUB17:CO(F,I+1)=DE(D):CA=
DE(D):GOSUB11:GOSUB18:GOTO66
84 ' Start of right-arrow.
85 HDRAW"BM188,11;U4R5U2F4G4U2L5
":XC=204:YC=15:GOSUB15
86 GOSUB6:IF N$="Q"THEN34ELSEIF
N$<"1"OR N$>"7"THEN86
87 F=VAL(N$):IF F=1THEN F=14
88 HDRAW"BM207,13;XN$(F);":IF F=
14THEN F=1
89 XC=186:YC=30:GOSUB15
90 GOSUB6:IF N$="Q"THEN34ELSEIF
N$<"1"OR N$>"7"THEN90
91 T=VAL(N$):IF T=1THEN T=14
92 HDRAW"BM190,28;XN$(T);":IF T=
14THEN T=1
93 J=20:IF CO(T,1)=0THEN115
94 J=J-1:IF COL(T,J)=0THEN94
95 CA=CO(T,J):GOSUB11:HR=RA:HS=S
U:HY=YC(F):HJ=J:I=20
96 I=I-1:IF I=0THEN23
97 IF CO(F,I)=0THEN96
98 CA=CO(F,I):GOSUB11:IF HR=RA+1
 THEN 101
99 I=I-1:IF I=0THEN23
100 HY=HY-9:IF HY=36THEN23ELSE98
101 N=SU+2:IF N>4THEN N=N-4
102 IF N=HS OR SU=HS THEN 23
103 HI=I:YC(F)=HY
104 J=J+1:CO(T,J)=CO(F,I):CO(F,I
)=0:I=I+1:IF CO(F,I)>0THEN104
105 I=HI:XC=F*44-33:IF CO(F,1)=0
THEN HLINE(XC,45)-(XC+32,183),PR
ESET,BF
106 GOSUB21
107 IF HY>45THEN YC(F)=HY-9
108 HLINE(XC,HY)-(XC+32,183),PRE
SET,BF:I=20
109 I=I-1:IF I=0THEN YC(F)=45:YC
=45:GOSUB17:GOTO112
110 IF CO(F,I)=0THEN109
111 CA=CO(F,I):GOSUB11:YC=YC(F):
GOSUB18
112 J=HJ:YC(T)=YC(T)-9:XC=T*44-3
3
113 IF CO(T,J)=0THEN34
114 YC(T)=YC(T)+9:CA=CO(T,J):GOS
```

```
UB11:YC=YC(T):GOSUB17:GOSUB18:J=
J+1:GOTO113
115 I=20:HY=YC(F)
116 I=I-1:IF I=0THEN23
117 IF CO(F,I)=0THEN116
118 CA=CO(F,I):GOSUB11:IF RA=13
THEN 121
119 I=I-1:IF I=0THEN23
120 HY=HY-9:IF HY=36THEN23ELSE11
8
121 YC(T)=45:YC(F)=45:HI=I:J=0:X
C=F*44-33:HLINE(XC,45)-(XC+32,18
3),PRESET,BF:XC=T*44-33:YC=45
122 J=J+1:CO(T,J)=CO(F,I):CO(F,I
)=0:CA=CO(T,J):GOSUB11:GOSUB18:I
=I+1:IF CO(F,I)=0THEN123ELSE YC(
T)=YC(T)+9:YC=YC(T):GOSUB17:GOTO
122
123 XC=F*44-33:I=HI-1:IF CO(F,1)
=0THEN YC=45:GOSUB17:GOSUB22:GOT
O34
124 IF CO(F,2)=0THEN GOSUB22
125 CA=CO(F,I):GOSUB11:YC=YC(F):
GOSUB18
126 I=I+1:IF CO(F,I)=0THEN34ELSE
 CO(F,I)=0:GOTO126
127 ' Start of left-arrow.
128 HDRAW"BM192,13;H4E4D2R5D4L5D
2":IF DE(1)=-1THEN23
129 CA=DE(D):GOSUB11:IF RA=ST(SU
)+1THEN64ELSE23
130 N$(0)="BUU4ER2FD4GL2H":N$(1)
="U4E2F2D2L3R3D2":N$(2)="BU5ER2F
DGL2GD2R4":N$(3)="BR3L2HBU4ER2FD
GLRFDG":N$(4)="BR3U6G3DR4":N$(5)
="BR3L2HBU5R4L4D2R3FD2G":N$(6)="
BR3L2HU4ER2FBD2BL3R2FDG"
131 N$(7)="BU6R4DG3D2":N$(8)="BR
3L2HUEHUER2FDGL2R2FDG":N$(9)="BU
FR2EU2L3HUER2FD4":N$(10)="R2LU5L
RUBR5R2FD4GL2HU4E":N$(11)="UDR3U
6L2R4":N$(12)="BR1HU4ER2FD4GLBUF
2":N$(13)="U6BR4G3F3":N$(14)="R2
LU6DLRBRBD5"
132 S$(1)="BR2H3UERFERFDG3U3GU2G
UR4DLD":S$(2)="R3HUEFU3GHEL3FGHD
3EFD2U4RDL":S$(3)="BU3F2E2H2G2R3
HD2":S$(4)="BRR2LU2L2R4UL4E2FL"
133 C$(1)="HUH2UH2UH2UHU3EUE2R3F
2E2R3F2DFD3GDG2DG2DG2DG":C$(2)="
L3ER2HU5G3L3H2U3E2R3FEH2U3E2R3F2
D3G2FER3F2D3G2L3H3D5F2L2":C$(3)=
"H3UH2UH3E3UE2UE3F3DF2DF3G3DG2DG
3":C$(4)="L2EU7G3L2H2U4EUE7F7DFD
4G2L2H3D7FL2"
134 RETURN
135 HSCREEN0:CLS:PRINT"YOU PRESS
ED BREAK":PRINT:PRINT"PRESS ENTE
R TO CONTINUE GAME":PRINT:PRINT"
PRESS SPACEBAR TO STOP"
136 Z$=INKEY$:IFZ$=" "THENEND EL
SEIFZ$=CHR$(13)THENPOKE59078,51:
HSCREEN2:POKE65434,8:GOTO38 ELSE
136
137 XC=186:YC=0:GOSUB17:FORF=1TO
7:I=20
138 IF CO(F,I)=0 THEN I=I-1 ELSE
 P(F)=I:GOTO140
139 IF I>0THEN138
140 NEXT
141 IF ST(1)+ST(2)+ST(3)+ST(4)=5
2THEN39
142 IF INKEY$="Q"THEN5
143 FORF=1TO7:I=P(F):IF I=0THEN1
50
144 CA=CO(F,I):N=CA:GOSUB11:IF R
A<>ST(SU)+1THEN150
145 XC=F*44-33:YC=YC(F):GOSUB17
146 CO(F,I)=0:IF YC(F)>45THEN YC
(F)=YC(F)-9
147 IF CO(F,1)=0THEN YC=45:GOSUB
17:GOTO149
148 CA=CO(F,I-1):GOSUB11:YC=YC(F
):GOSUB18:P(F)=P(F)-1
149 CA=N:GOSUB11:ST(SU)=ST(SU)+1
:XC=SU*44-33:YC=0:GOSUB17:GOSUB1
8
150 NEXT:GOTO141
```

CoCo Cat

By Logan Ward


THIS POSE SHOULD DO IT !
SNAP
I CAN'T WAIT TO SEE THE PRINTOUT OF MY DIGITIZED PICTURE !
CHUG CHUG
EGAD ! LOOK WHAT MY COCO JUST PRINTED. I THINK IT'S LOST ITS MEMORY !

Feature Speech/Sound Cartridge Multi-Pack Interface 64K Disk

First in a series of articles developing a new, talking spelling tutor

EduSpell

By Samuel D. Johnson

Entries
Selection C
Conv
MODULES
SUBMENU
UPDATE
Subprograms

One of the most aggravating problems facing management today is that people cannot spell. At best, poor spelling distracts people who notice it, causes confusion and is embarrassing. Parents and teachers alike admit to consternation and only limited success with students who have difficulty learning to spell. One of the primary reasons for this situation, I believe, is the lack of one-on-one tutoring.

Your CoCo can outshine any computer available at even five to 10 times its cost in taking over your tutorial duties. Although several programs have appeared recently, those available for the CoCo present either multiple choices or pictures. While helpful, these methods unduly restrict the CoCo's capabilities.

Additionally, most applications software would easily run in 64K bytes of memory, but the software companies put in elaborate Hi-Res graphics to dress it up to sell to the unwitting public. This takes up enormous amounts of memory. And the graphics are quickly determined to be little more than minor entertainment with no real benefit, so they wind up in a dusty corner of the classroom.

Sam Johnson, a lieutenant commander in the U.S. Navy, is currently stationed in Charleston, S.C. He is an honor graduate of Vanderbilt University and holds an electrical engineering degree. His username on Delphi is SDJ9060.

Graphics are sometimes actually distractions from the given task. Some teaching aids draw attention only to themselves, and students do not retain the desired knowledge. They may indeed be enthralled with an educational computer game, but they're watching the little bugs go around the screen, not paying any attention at all to the lesson. If you quiz them even immediately following such sessions, they have retained virtually nothing.

Tandy's Speech/Sound Cartridge ((SS/C) enables CoCo to do a great many of the tasks requiring two-way communications between tutor and student. CoCo can thus handle some of your most exasperating problems: administering drills specific to the needs of the individual, one-on-one quizzes to permit on-the-spot correction and evaluation (read *The One-Minute Manager* sometime) and maintaining records that reflect each student's actual learning data and needs.

In this series, we will develop an educational software system called *EduSpell*, which requires a 64K CoCo with at least one disk drive, a Multi-Pak Interface and the SS/C. *EduSpell* is written entirely in Disk Extended Color BASIC to permit easy customizing.

EduSpell is designed as a tool for primary school teachers and parents; however, its programming concepts will find many other applications. *EduSpell* will prove to nonbelievers that CoCo can play hard ball with the big boys in education — and win — because of its versatility and the simple fact that basic teaching skills cannot be supplanted by the sales pitch the guy at the store gave you.

Briefly, *EduSpell* is capable of building a spelling dictionary, using that dictionary to build spelling tests and administering the tests orally using the SS/C. In addition, the program will perform various editorial tasks associated with updating the dictionary, printing out records and files — and some miscellaneous goodies that have proved useful and fun. Tests can be generated directly from a textbook, the dictionary or recent classroom tests.

The dictionary consists of words with two different spellings stored. The correct spelling is used for comparison to the students' answer. The other is used for speech synthesis to ensure a correct pronunciation. Each data field also contains eleven bytes of information. Four are used to monitor the students' performance and evaluate the quality of speech synthesis, three contain the date the word was entered into the dictionary and the others facilitate system functions. My working-edition dictionary currently contains about 700 words, but as many as 1,500 words — including several test files and student records — could probably be accommodated on a one-drive system and many times that on a multi-drive system. Typical spelling books in the upper elementary grades contain about 1,000 words.

The *EduSpell* system is highly menu-driven, with many single-stroke command entries available. The current system has available over 50 help screens describing the various procedures and options. Although some bells and whistles are used in *EduSpell*, user-simplicity and a back-to-basics approach are its salient features.

About the SS/C

The SS/C has the potential to be used very effectively in the classroom. For an application like *EduSpell*, it may be advantageous to provide privacy by giving the students headphones plugged into the monitor, perhaps even booths.

It is complicated to program the SS/C with any more sophistication than the simple synthesis program here, but it can be done. The manual for Tandy's SS/C is not written for the beginner. It assumes a rather high level of knowledge about "registers" and "postbytes." Although examples are given, they are not adequately explained. Until recently, even the Tandy software that used the SS/C did not fully realize its capability and was usually limited to simple bells and whistles and very basic, almost unintelligible speech. Still, parts of the example program on Page 11 of the SS/C manual are used in *EduSpell* and serve quite well.

To use the SS/C speech subroutine starting at Line 1450 of Listing 4, a string 128 characters or less in length (`A$`) is input, ensuring time delays to allow the cartridge to reset as explained in the manual. In dealing with young people, timing is critical to maintaining interest, so the delays are programmable by varying `XB` in the loop at Line 1560. For short words, the program routes directly to Line 1450 and uses the default value of 400 for `XB`. Some branch to the medium setting of 1000, set at Line 1440; but for the longer verbalizations when phrases are used, a variable timer sets the delay proportional to the length of the phrase. Short phrases seem to require a longer proportionality constant, so they go to Line 1420 to set `XB` at 99 times the length of the phrase. The longer phrases go to Line 1430 to set `XB` at 60 times the length of the phrase. These settings are critical to the proper functioning of the SS/C and the effectiveness of application.

Setting Up

You must relocate the disk ROM to the upper RAM in order to use the SS/C. If you are not using a CoCo 3, which has already taken care of this matter, an excellent method of doing this is the now-famous `ROMRAM` routine (Listing 1). You can modify your system parameters by adding the following lines to the end of `ROMRAM`:

```
200 POKE &HD7C0,0:Pike &HD816, 20
(speeds disk access time to 6 ms)
210 FOR X55180 TO 55182:POKE X,
18:NEXT X
(speeds disk I/O time)
220 POKE 150, 18
(sets 2400 baud rate to printer)
230 RUN "SPELLER"
```

Other values for disk access and I/O times can be found in your RAINBOW back issues and printer baud rate settings can be found in Tandy's BASIC manuals. You may omit lines 200 through 220 altogether if you want.

Type in and save each of the four listings to disk exactly as they appear and are titled. If you want to change the names of the listings, feel free. However, you must also change the program filenames within the listings.

Listing 2, (`SETHELP`) establishes the data file, `HELP.SCN`. The first record in `HELP.SCN` is used to store and transfer the date and program branching instructions. The other records contain codes for the 12 help screens. Eventually, there will be more than 50 screens available.

The help screens are called by a subroutine and displayed automatically. Look at Line 590 of Listing 3, `SPELLER`. If H is pressed at this time (or any time command `H` is indicated as available), the appropriate `HS` (Help record Start number) and `HE` (Help record End number) are assigned; execution is transferred to the subroutine beginning at Line 4000. This is a handy way to standardize your BASIC programs to use help screens.

The speed-up poke (`POKE 65495,0`)

Still pounding away at that keyboard?

RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE
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is used in the help screen subroutine in `SPELLER` to speed printing the messages on the screen. If you delete that poke from Line 4030, you can also delete the slow-down pokes from lines 4010, 4030 and 4100. You can gain some speed by lowering the value of the timing variable `X9` in Line 4090 to about 100.

The `SETHELP` program sets up a supporting data file, `HELP.SCN`, and only needs to be saved on your master copy of *EduSpell* since it is not used after initial setup. However, we will add numerous help screens in later installments, so don't let it get too far away.

Run `SETHELP` to set up the data file. I recommend making several backup copies. Now, barring bugs, you're ready to go.

Using *EduSpell*

That brings us to Listing 3. The main program, `SPELLER`, is used to make up tests (and later to add new words to the dictionary). For now, `SPELLER` is executed by `ROMRAM` and automatically jumps to the word-entry routine beginning at Line 500, where words and levels of difficulty are entered. Other parameters are also initialized automatically. Up to 50 words can be entered at a time. (Most spelling tests only have 10 to 20 words, and fifty is the highest number of words I have ever seen on such a test.)

After creating the system disk (outlined in the "up And Running Sidebar") and running `SPELLER`, you will be prompted to enter the date: YR/MO/DA (Year/Month/Day). Each entry must include two characters, so months and days that include only one numerical character must include zeros. For example: September 8, 1988 must be entered as `88/09/08`. Press `ENTER` to verify that the date is correct.

You will then be prompted to enter the first word of your spelling test. After typing the word, the CoCo will pronounce the word and prompt you to enter the level of difficulty. If the word is pronounced correctly, simply press ENTER. If it is not pronounced correctly, press the space bar and you will be prompted to spell the word exactly as it sounds. For example: The word "people" is pronounced more appropriately by the SS/C by typing "peepul" at the `NEW SOUND:` prompt. Try different variations until the word is pronounced correctly, then press ENTER.

When all the words have been entered, you may review the test before saving it to disk. Simply press R after the last word has been entered and the spelling words will be displayed on the screen. At this point, you will be given the following options:

E	Enter more words
D	Delete words
S	Save test to disk
C	Change Pronunciation
V	Voice (pronounces each word in order)
H	Help

After reviewing the spelling words, press S to save the test to your program disk. You will then be prompted for a filename (name of test) of eight or less characters, which is stored in Record 1 of `HELP.SCN`, and stored on disk. Execution is then transferred to the `TAKETEST` program (Listing 4). Be sure to save the files to your program disk so `SPELLER` can load `TAKETEST`.

You may note that the last four bytes of data are initialized to `CHR$(0)` and never used. These four bytes will be used later for dictionary and editing functions. Also, the direct access disk file mode is used throughout because disk access times will become important later.

Listing 4, `TAKETEST` is the program that administers the test and practive sessions. It begins by inspecting `HELP.SCN` Record 1 to determine which test and format (practice session or exam) it is to give. Lines 130 to 180 then afford an opportunity to change your mind about the test and format. If you do not want to change anything, do nothing. A timing loop will have CoCo continue after about three seconds. A screen describing how to ask CoCo to repeat word pronunciation is shown momentarily. Then the SS/C anounces the number of words in the test, and the session then begins.

A scoreboard, which will indicate the number of words asked, the number correctly spelled on the first try and the score as a percentage, appears at the top of the screen. CoCo then begins the session by asking the student to spell the first word. The student must enter the attempted spelling, affirming the attempt by pressing ENTER. Any time before the answer is entered, the student may have the word pronounced again by pressing the up arrow key. The answer is compared to the actual spelling contained in `W$(1,I)`. The program then branches to either Line 720 (correct) or 770 (incorrect).

If the word is spelled correctly, CoCo verbalizes its congratulations, computes the score for the display and goes on to the next word. If the answer is incorrect, the computer admonishes the

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student to do better. If it is a practice session, CoCo asks the word a second time — and third, if required. If the word is misspelled three times, the computer gives the correct spelling (both orally and on the screen) and will then ask it again sometime during the session. Of course, no credit is given for a misspelled word.

One of the central features of this program is the keyboard routine, lines 490 to 560, where the student enters the answer. A string is built with each letter typed until ENTER is pressed. Except for the up arrow, used to request the pronunciation again, all other keys are ignored. (A low-pitched beep will indicate a typing error.) This is essentially a BASIC-programmed interrupt routine. Because speed is essential so confident spellers may type quickly, the speed-up poke in Line 350 helps significantly. If you cannot use the poke, delete it and the key-beep (`SOUND 240,1`) in Line 530 to regain some of the lost speed. The speed-up poke is also used in Line 1550 and can be deleted with no problems. If you delete the speed-up pokes, you can also delete the slow-down pokes in lines 910 and 1450.

At the end of the session, students are informed of their scores. (In a later article, we will learn how to save the results to disk). CoCo will give these results audibly, rather than visually, by jumping to the routine, lines 1190 to 1410, to structure the number to be verbalized. This procedure is also used in the beginning when CoCo announces how many words are in the session. This procedure is clear and simple to follow, so no help screens have been included.

EduSpell has been operational in my house for some time. Our 12-year-old son has taken numerous tests with it. I believe it has stimulated his interest and truly helped him in his spelling. *EduSpell* will be an excellent addition to your educational library. Moreover, it uses numerous programming features easily adapted to other applications and incorporates several programming concepts taken from the pages of RAINBOW. If you have been looking for a way to use all these great programs, *EduSpell* is for you.

In this issue, we created *EduSpell* and learned how to use it to build, store and administer spelling tests. Future articles in this series will cover the following topics:

- Building a dictionary and using it to build tests
- Editing and other goodies
- Maintaining student records and teacher accessories

Up and Running

The programs presented in this article will run on all Color Computers (CoCos 1, 2 and 3) with at least 64K of memory and one disk drive, a Tandy Speech/Sound Cartridge and Multi-Pak Interface. Use the following instructions for setting up your system and running the programs:

1) Before turning on the CoCo, be sure to insert the Tandy Speech/Sound Cartridge (SS/C) into Slot 1 of the Multi-Pak Interface.
2) Type in and save each of the four BASIC listings to disk exactly as they appear and are titled.
3) Run Listing 2, `SETHELP`. Be sure to leave your working disk in the drive, as `SETHELP` creates the data file, `HELP.SCN` and automatically saves it to your working disk.
4) Remove the disk from the drive and do a cold start (turn the computer off for at least 15 seconds and then back on again).
5) If you are using a CoCo 1 or 2, you must first relocate the disk ROM to upper RAM (in order to use the SS/C) by running Listing 1, `ROMRAM`. `ROMRAM` will automatically load Listing 3, `SPELLER` into memory. If you are using a CoCo 3, simply `RUN"SPELLER"`.

Listing 1: `ROMRAM`

```
1 'ROMRAM 8/85 RAINBOW
2 CLEAR 999
3 DATA 26,80,190,128,0,183,255,2
22,166,128
4 DATA 183,255,223,167,31,140,22
4,0,37,241,57
5 FOR I=1 TO 21:READ A:A$=A$+CHR
$(A):NEXT I
6 P=VARPTR(A$)+1
7 POKE P,126
8 EXEC P
9 POKE&HD7C0,0:POKE&HD816,20'->
6MS DISK ACCESS TIME
10 FOR X=55180TO55182:POKEX,18:N
EXT X'QUICKENS DISK I/O TIME
11 POKE 150,18 '2400 BAUD
12 RUN"SPELLER"
```

Listing 2: `SETHELP`

```
10 OPEN"D",#1,"HELP/SCN",130
20 FIELD#1,130 AS A$
30 MU=12 ' *** MU --> NO. OF HEL
P SCREENS
40 FOR I=1 TO MU
50 B$=STRING$(130,CHR$(0))
60 READ B$
70 LSET A$=B$
80 PUT #1,I+1
90 NEXT I
100 PRINT "DONE"
110 END
1000 ' *** (1-7) FROM speller LI
NE 800
1010 DATA" E       <e>
            ENTER MORE WORDS"
1020 DATA" d    <d>ELETE    DELE
TE A WORD   YOU WILL BE     ASKE
D WHICH     IF YOU CHANGE   YOUR
 MIND, PUSH ANYTHING EXCEPT A NU
MBER"
1030 DATA" s     <s>ave
```

```
         SAVE WORDLIST TODISK
 ... USES  SELECTED WORDS"
1040 DATA" c    <c>HANGE
           PERMITS CHANGING
           PRONUNCIATION OF
                A WORD"
1050 DATA" v    <v>OICE
           TOGGLES VOICE ON
                OR OFF"
1060 DATA"UP
UP ARROW                       g
o back to                   prev
ious screen"
1070 DATA"DN                   D
OWN ARROW                      g
o down to                     ne
xt screen"
2000 ' *** (8-12) FROM speller L
INE 530
2010 DATA"          <enter>
              WORD IS OKAY
             GO ON TO NEXT"
2020 DATA"            <bar>
                    CHANGE
             PRONUNCIATION"
2030 DATA"            <clr>
                    DELETE
  THIS               WORD"
2040 DATA" r     <r>EVIEW
            REVIEW WORDS YOU
            HAVE ENTERED SO
            FAR"
2050 DATA" s       <s>AVE
            SAVE TEST TO    DISK
  ... USES  WORDS IN REVIEW SECT
ION"
```

130	53	2040	108
580	138	4020	182
770	167	END	226
930	254		

Listing 3: SPELLER

```
10 PCLEAR1:CLEAR5000:XB=500:GOTO
50 ' *** INITIALIZE (XB -> DELAY
 TIME)
20 POKE65494,0:OPEN"D",#1,"HELP/
SCN",17 ' *** STORE NAME OF TEST
, TEST OR PRACTICE (TP) & DATE I
N HELP/SCN RECORD NO. 1
30 FIELD#1,12AS A$,2AS B$,3AS C$
40 LSET A$=F$:LSET B$="0"+CHR$(T
P):LSET C$=DA$:PUT#1,1:CLOSE#1:R
ETURN ' *** STORE NAME OF FILE
50 DIM W$(3,50),A$(3,100),S$(100
),D$(68),B$(6)
60 Z1$="        ##  %
       %":Z4$=STRING$(32," ")
70 Z$="### % % #  %
       %"
100 GOSUB3110:PRINT@43,"enter da
te: YR/MO/DA";:PRINT@119,"--/--/
--";:PRINT@119,"";:LINEINPUT"";D
A$:SOUND200,1 ' *** ENTER DATE R
OUTINE
110 S1=INSTR(DA$,"/"):S2=INSTR(4
,DA$,"/"):IF S1=3AND S2=6THEN120
ELSE PRINT@454,"wrong format ...
";:SOUND120,2:GOSUB3210:GOTO100
120 YR=VAL(MID$(DA$,1,2)):MO=VAL
(MID$(DA$,4,2)):DA=VAL(MID$(DA$,
7,2)):DA$=CHR$(YR)+CHR$(MO)+CHR$
(DA)
130 PRINT@454,USING"VERIFY ##/##
/##";YR,MO,DA;:GOSUB3010:IF Y$="
Y"OR Y$=CHR$(13)THEN500ELSE100
500 GOSUB3110:I=0:A$="ENTER THE
WORD":GOSUB2010:A$="THEN SLASH":
GOSUB2010:A$="THEN THE LEVVEL OF
 DIFFICULTY":GOSUB2010:A$="AS FO
LLOWS":GOSUB2010 ' *** BEGIN "EN
TER WORDS" ROUTINE
510 GOSUB3110:PRINT"enter: WORD/
'LEVEL'";:XB=800:GOSUB3210
520 I=I+1:IF I>50THEN I=50:GOSUB
3110:A$="THAT WAS FIFTY":PRINT@2
64,A$;:GOSUB2010:Y$="S":GOTO600
530 GOSUB3110:LINE INPUT"enter w
ord: ";D$:IF D$=""THEN530ELSE FO
R D=1 TO LEN(D$):IF MID$(D$,D,1)
="/"THEN 540 ELSE NEXT D
540 L$=MID$(D$,D+1):W$(1,I)=LEFT
$(D$,D-1):W$(2,I)=W$(1,I):A$=W$(
2,I):XB=40*LEN(D$):GOSUB2020
550 IF LEN(L$)<1THEN PRINT@37,"l
evel: ";:LINEINPUT"";L$
560 W$(3,I)=STRING$(11,CHR$(0)):
MID$(W$(3,I),4,1)=CHR$(VAL(L$))
570 PRINT W$(1,I);" =":PRINT"
      ";W$(2,I);:IF X8=1THEN XB=7
00:GOSUB3210:RETURN
580 PRINT@480,"<enter> <bar> <cl
r> <r> <s> <h>";
590 GOSUB3010:IF Y$=CHR$(12)THEN
530ELSE IF Y$="H"THEN HS=8:HE=12
:GOSUB4010:CLS:PRINT"verify:";:G
OTO570
600 IF Y$<>"S"AND Y$<>"R"THEN610
ELSE NN=I:FOR I=1TO NN:MID$(W$(3
,I),5,3)=DA$:NEXT I:IF Y$="S"THE
N910ELSE710
610 IF Y$=CHR$(32)THEN630
```

```
620 IF Y$=CHR$(13)THEN520ELSE590
630 PRINT@352,Z4$;Z4$;Z4$;:PRINT
@352,"";:LINE INPUT"new sound: "
;A$:IF A$=""THEN630ELSE W$(2,I)=
A$:GOSUB2010:GOTO570
700 ' *** REVIEW WORDS SUBROUTIN
E
710 V=0:Z=2:UNLOAD:FOR L=0TO9 '
*** V=0 --> VOICE 'OFF'; Z=2 -->
 DON'T REPRONOUNCE FOR <UP> AT L
INE 2090
720 X8=0:GOSUB3110:PRINT"review
test words";:IF L<0THEN SOUND100
,1:L=0 'V=0 SETS VOICE 'OFF'
730 FOR P=1 TO 10:I=10*L+P:IF I>
NN THEN770
740 PRINT@32*(P+2),USING" ### %
                 %";I,W$(1,I)
750 IF V=1THEN A$=W$(2,I):GOSUB2
010 'PRONOUNCE IF V=1 --> VOICE
'ON'
760 NEXT P
770 PRINT@484,"<e/d/s/c/v> <UP>
<DN> <h>";
780 GOSUB3010:IF Y$="D"THEN B$="
DELETE":GOSUB1010:GOTO720ELSE IF
 Y$="V"THEN V=ABS(FIX(V/2-1)):GO
TO730 ' V --> TOGGLE VOICE ON/OF
F
790 IF Y$="S"THEN910ELSE IF Y$=C
HR$(95)THEN L=L-1:GOTO720ELSE IF
 Y$="E"THEN I=NN:Z=1:GOTO510ELSE
 IF Y$=CHR$(91)THEN NEXT L:GOTO9
10ELSE IF Y$="C"THEN X8=1:B$="CH
ANGE":GOSUB1010:GOSUB630:GOTO720
800 IF Y$="H"THEN HS=1:HE=7:GOSU
B4010:GOTO720ELSE780
900 ' *** ENTER NAME OF TEST HER
E AND STORE DATA TO DISK IN HELP
/SCN ; THEN STORE TEST TO DISK
910 GOSUB3110:PRINT@270,"-------
-/TST";:PRINT@311,"(assumed)";:P
RINT@256,"";:LINE INPUT"name of
test: ";F$:F$=F$+"/TST"
920 PRINT@352,"test OR practice?
";:PRINT@389,"<1> test";:PRINT@4
21,"<2> practice";:GOSUB3010:TP=
VAL(Y$):IF TP<1OR TP>2THEN SOUND
100,3:GOTO920
930 GOSUB20:OPEN"D",#1,F$,51
940 FIELD#1,20 AS A$,20 AS B$,11
 AS C$
950 FOR I=1TO NN
960 LSET A$=W$(1,I):LSET B$=W$(2
,I):LSET C$=W$(3,I)
970 PUT#1,I:NEXT I:CLOSE#1
980 CLS4:RUN"TAKETEST"
1000 ' *** DELETE AN ENTRY SUBRO
UTINE
1010 PRINT@479,Z4$;:A$="ENTER NU
MBER TO "+B$:XB=50*LEN(A$):GOSUB
2020:PRINT@480,A$;": ";:GOSUB301
0
1020 IF X8=1THEN I=VAL(Y$)+10*L:
RETURN
1030 IF ASC(Y$)>57OR ASC(Y$)<48T
HEN RETURN
1040 NN=NN-1:Y=VAL(Y$):IF Y=0THE
N Y=10
1050 Y=10*L+Y:FOR I=Y TO NN:FOR
P=1TO3:W$(P,I)=W$(P,I+1) :NEXT P
,I:RETURN
2000 ' *** PROGRAMMABLE TIME DEL
AY
2010 XB=40*LEN(A$)
2020 X=&HFF00:Y=&HFF7E:POKE X+1,
52:POKE X+3,63:POKE X+35,60 ' **
* SPEECH SUBROUTINE ... FROM TAN
DY'S SS/C MANUAL
2030 POKE 65407,34:FOR M=1 TO LE
N(A$) ' *** 65407 POKE TOGGLES M
ULTI-PAK POSITIONS ... SEE MULTI
-PAK MANUAL
2040 IF PEEK(Y)AND128=0THEN2040
2050 POKE Y,ASC(MID$(A$,M,1))
2060 NEXT M
2070 IF PEEK(Y)AND128=0THEN2070
2080 POKE Y,13:GOSUB3210:POKE654
07,51:RETURN
3000 ' *** STROBE KEYBOARD FOR I
NPUT
3010 Y$=INKEY$
3020 Y$=INKEY$:IF Y$=""THEN3020
3030 IF Y$=CHR$(94)AND Z<>2THEN
GOSUB2020 ' *** REPEAT PRONUNCIA
TION IF UP ARROW WAS PRESSED, EX
CEPT DURING REVIEW (THEN Z=2)
3040 RETURN
3100 ' *** SCREEN CLEAR SUBROUTI
NE
3110 CLS:SOUND200,1:RETURN
3200 ' *** VARIABLE TIME DELAY S
UBROUTINE
3210 FOR X9=1TO XB:NEXT X9:XB=50
0:RETURN
4000 ' *** BEGIN HELP SCREEN SUB
ROUTINE
4010 POKE65494,0:OPEN"D",#2,"HEL
P/SCN",130
4020 FIELD#2,130 AS H$
4030 FOR H=HS TO HE:POKE65494,0:
GET#2,H+1:POKE65495,0 ' *** SLOW
 DOWN POKE FOR DISK I/O
4040 CLS8:PRINT@43,"H  E  L  P";
4050 FOR HT=6TO13:PRINT@32*HT+8,
STRING$(16," ");:NEXT HT ' *** D
RAWS A BOX IN THE MIDDLE OF THE
SCREEN
4060 H1$=MID$(H$,1,2):IF H1$<>"
"THEN PRINT@110,USING"<%%>";H1$
; ' *** DISPLAY THE COMMAND STRO
KE, IF ANY, ABOVE THE BOX
```

```
4070 FOR H1=1TO8:PRINT@32*(4+H1)
+8,MID$(H$,16*(H1-1)+3,16);:NEXT
 H1 ' *** DISPLAY THE MESSAGE IN
SIDE THE BOX
4080 PRINT@488,"<w>AIT <r>ETURN"
;
4090 Y$=INKEY$:FOR X9=1TO200:Y$=
INKEY$:IF Y$=""THEN NEXT X9 ' **
* INTERRUPT-LIKE SUBROUTINE
4100 IF Y$="R"THEN CLOSE#2:POKE6
5494,0:RETURN
4110 IF Y$<>"W"THEN NEXT H:GOTO4
030ELSE HT=19
4120 X9=INSTR(HT,H$," "):IF X9>H
T+1THEN A$=MID$(H$,HT+1,130-HT)E
LSE HT=X9+1:GOTO4120
4130 A=LEN(A$):HT=INSTR(HT,A$,"
 ")+1:IF HT=1THEN4140ELSE A$=MID
$(A$,1,HT-1)+MID$(A$,HT+1,A-HT):
GOTO4130
4140 XB=20*LEN(A$):GOSUB2020:PRI
NT@504,"(other)";:GOSUB3010:GOTO
4100
```

140	3	850	146
250	249	970	29
380	233	1170	210
500	168	1350	228
600	72	END	91
710	62		

Listing 4: TAKETEST

```
10 ' *** TAKETEST ADMINISTERS TH
E SESSION
20 FILES 2,570:PCLEAR1:CLEAR 100
00:XB=400 ' *** XB INITIALIZES T
IME DELAY SETTING IN LINE 1560
30 DIM W$(3,50),R(10),S$(10),D$(
10),C$(10),B$(3),W(50),TP$(2)
40 TP$(1)="test":TP$(2)="practic
e"
50 CLS5:PRINT@261,"--------";:PR
INT@192,"enter your name:";:PRIN
T@261,"";:LINEINPUT"";RN$
60 CLS5:PRINT@232,"GETTING WORDS
";:PRINT@288+(13-LEN(RN$))/2,"on
e moment, please ";RN$;:A$="1 MO
MENT PLEEZ"+RN$:GOSUB1430:POKE65
494,0
70 OPEN"D",#1,"HELP/SCN",17
80 FIELD#1,12AS A$,2AS B$,3AS C$
```

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```
90 F$=STRING$(8," ")+"/TST":GET#
1,1:F=INSTR(A$,"/"):MID$(F$,1,F-
1)=LEFT$(A$,F-1) ' *** GETS NAME
 OF TEST FILE
100 YR$=MID$(C$,1,1):MO$=MID$(C$
,2,1):DA$=MID$(C$,3,1) ' *** GET
S DATE INFO
110 TP=ASC(MID$(B$,2,1)) ' *** T
P --> TEST OR PRACTICE
120 CLOSE#1
130 ' *** CHANGE FILE NAME TO EX
ECUTE
140 GOSUB1000:PRINT@192,"SELECTE
D TEST IS: ";F$;:PRINT@268,"FOR
";TP$(TP);:PRINT@352,"change fil
e?";
150 FOR Y=1TO300 ' *** SHORT INT
ERRUPT-LIKE DELAY
160 Y$=INKEY$:IF Y$="Y"THEN170EL
SE NEXT Y:GOTO190
170 GOSUB1000:PRINT@17,"--------
";:PRINT@49,"/TST ASSUMED";:PRIN
T@0,"";:LINEINPUT"enter file nam
e: ";F$:F$=F$+"/TST" ' *** CHANG
ES FILE NAME
180 PRINT@330,"TEST OR PRACTICE?
";:PRINT@367,"<1> test";:PRINT@3
99,"<2> practice";:GOSUB1570:TP=
VAL(Y$):IF TP<1OR TP>2THEN SOUND
120,3:GOTO180
190 ' *** LOAD SPELLING WORDS FR
OM F$
200 J=0:OPEN"D",#1,F$,51
210 FIELD#1,20 AS B$(1),20 AS B$
(2),11 AS B$(3)
220 E=LOF(1)
230 FOR I=1 TO E
240 GET#1,I:W$(1,I)=B$(1):W$(2,I
)=B$(2):W$(3,I)=B$(3):NEXT I
250 CLOSE#1
260 ' *** DISPLAY NOTE TO EXPLAI
N PROCEDURE TO ASK COCO FOR WORD
 REPEAT
270 CLS4:SOUND200,1:FOR X9=4TO12
:PRINT@32*X9+8,STRING$(16," ");:
NEXT X9
280 PRINT@171,"n  o  t  e";
290 PRINT@232,"YOU MAY ASK TO";:
PRINT@264,"HAVE ANY WORD";:PRINT
@296,"REPRONOUNCED AT";:PRINT@32
8,"ANYTIME ....";:PRINT@393,"JUS
T PRESS <^>";
300 XB=1200:GOSUB1560
310 ' *** COMMENCE SESSION
320 UNLOAD:GOSUB 1000:A$="O K WE
 WILL START NOW":GOSUB1440:XB=10
00:GOSUB1560
330 EN=E:GOSUB1190:A$="THIS TEST
 HAS "+E$+" WORDSS   GET READY":
GOSUB1430:GOSUB1000
340 Z$="score = ### out of ### =
 ###.# %"
350 POKE65495,0:K=0:S=0:T=0:P=0:
KK=0:GOSUB1020 ' *** SPEEDUP POK
E AND INITIALIZE VARIABLES
360 FOR I=1 TO E
370 C1=C1+C:C=0 ' *** C1 --> TOT
AL NO. REPEAT REQUESTS THIS SESS
ION ... C --> NO. REPEAT REQUEST
S PREVIOUS WORD (IF ANY), SO MUS
T BE RESET TO 0
380 ' *** SHORTEN WORD OF BLANK
SPACES AT END, IF ANY
390 FOR X9=20TO1STEP-1:IF MID$(W
$(1,I),X9,1)<>" "THEN W$(1,I)=LE
FT$(W$(1,I),X9)ELSE NEXT X9
400 ' *** SAME FOR PRONUNCIATION
410 FOR X9=20TO1STEP-1:IF MID$(W
$(2,I),X9,1)<>" "THEN W$(2,I)=LE
FT$(W$(2,I),X9)ELSE NEXT X9
420 ' *** LL --> COUNT OF WORDS
TO REDO (IF PRACTICE)
430 II=I:LL=0:J=1:C$=""
440 ' *** IF ANY REPEATS EXIST (
I.E.- KK<>0), THEN 1 IN 10 CHANC
E, ONE OF THEM WILL BE ASKED HER
E (NO CREDIT BASIS), UNLESS A GR
ADED EXAM
450 IF KK=0THEN460ELSE R=RND(99)
:IF R>89THEN R=RND(K):I=R(R):LL=
1
460 B$="":CLS ' *** RESET INPUT
STRING VARIABLE (B$) TO NULL
470 PRINT USING Z$;S,T,P;
480 PRINT@163,C$; ' *** C$ IS SE
T TO LAST INCORRECT SPELLING OF
THIS WORD (IF ANY)
490 GOSUB1560:A$="SPELL":GOSUB14
50:A$=W$(2,I):GOSUB1420
500 SOUND100,1
510 PRINT@256,"ANSWER: ";B$;:Y$=
INKEY$ ' *** PRINTS CURRENT ENTR
Y FOR THE ANSWER AND CLEARS KEYB
OARD
520 Y$=INKEY$:IF Y$=""THEN520ELS
E Y=ASC(Y$) ' *** WAIT ON KEYSTR
OKE
530 IF Y>64 AND Y<91THEN B$=B$+Y
$:SOUND240,1:GOTO510ELSE IF Y$=C
HR$(8)THEN570ELSE IF Y$=CHR$(94)
THEN C=C+1:GOSUB1450:GOTO510ELSE
 IF Y$=CHR$(13)THEN580ELSE SOUND
100,1:GOTO510
540 ' *** CHR$(8) --> BACKSPACE
(LEFT ARROW)
550 ' *** CHR$(94) --> REPEAT PR
ONUNCIATION (UP ARROW)
560 ' *** C --> NO. OF REPEAT RE
QUESTS THIS WORD
570 B=LEN(B$):IF B<1THEN500ELSE
B$=LEFT$(B$,B-1):PRINT@256,STRIN
G$(32," "):GOTO500
```

```
580 B=LEN(B$):IF LEFT$(B$,1)=" "
THEN B$=RIGHT$(B$,B-1):GOTO 580
' *** DELETES BLANKS FROM START
OF WORD, IF ANY
590 B=LEN(B$):IF RIGHT$(B$,1)="
"THEN B$=LEFT$(B$,B-1):GOTO590 '
 *** DELETES ANY BLANKS FROM END
 OF ANSWER
600 IF B$=W$(1,I) THEN C$="":GOS
UB720:GOTO620 ' *** BRANCH IF CO
RRECT ANSWER
610 GOSUB770:IF TP=1THEN650ELSE
IF LL=1THEN620ELSE J=J+1:IFJ=4TH
ENGOSUB830ELSE460
620 IF JJ=2THEN GOSUB1560:RETURN
 ' *** JJ --> THIS IS A WORD REP
EATED DUE TO PREVIOUS FAILURE IN
 THREE TRIES
630 IF LL=1THEN II=II-1 ' *** LL
=1 --> WORD WAS BEING REPEATED B
Y RANDOM SELECTION,SO NOW MUST R
ESET 'I' TO ONE LESS TO GET WORD
 THAT WOULD HAVE BEEN STATED
640 IF TP<>1THEN I=II
650 NEXT I:IF TP=1THEN910 ' ***
DO NOT REPEATY WORDS IF THIS IS
A GRADED EXAM
660 IF KK<=0THEN910 ' *** NO REP
EATS LEFT SINCE K<=0
670 IF KK=1THEN A$="JUST 1 WORD
LEFT"ELSE A$="SEEMS WE HAVE A FE
W WORDS LEFT":GOSUB1430:LL=1
680 FOR X=1 TO K ' *** K --> NO.
 WORDS TO REPEAT AFTER FIRST PAS
S
690 CLS:I=R(X):IF I=0THEN910
700 LL=1:JJ=2:GOSUB460:NEXT X
710 GOSUB1560:GOTO910
720 D=RND(8):A$=C$(D):GOSUB1430
' *** RIGHT ANSWER - GIVE CONGRA
TULATIONS
730 IF LL=0 AND J=1THEN740ELSE75
0 ' *** IF REPEAT WORD, DO NOT C
HANGE SCORE
740 T=T+1:S=S+1:P=S/T*100:RETURN
750 A$="U FINE ULLY GOT THAET 1
RIGHT":GOSUB1430
760 KK=KK-1:R(K)=0:RETURN
770 D=RND(8):C$=B$+" was wrong!"
:IF TP<>1THEN A$="RONG THATSS"+S
TR$(J):GOSUB1430
780 A$=D$(D):GOSUB1430 ' *** STA
TE CHIDING PHRASE
790 IF LL=1AND TP<>1THEN820 ' **
* IF REPEAT WORD DO NOT CHANGE S
CORE, BUT EXECUTE REPEAT PROCEDU
RE
800 IF J=1THEN T=T+1 ' *** T -->
 NO. OF ORIGINAL WORDS ASKED SO
FAR
810 P=S/T*100:RETURN ' *** P -->
 % ... S --> NO. CORRECT (FIRST
TRY ONLY)
820 A$="TRY AGGIN LAITER":GOSUB1
430:RETURN
830 K=K+1:R(K)=I:KK=KK+1 ' *** I
F 3 WRONG TRIES, SPELL OUT AND S
AVE FOR LATER REPEAT IN R(K)
840 A$="HERE IS THE ANNSER":XB=2
800:GOSUB1450
850 B$=" ":A$=W$(2,I)+"  IS SPEL
LED  ":GOSUB1430:GOSUB1560
860 CLS2:X8=LEN(W$(1,I)):PRINT@1
93,STRING$(31," ");
870 FOR X9=1 TO X8:A$=MID$(W$(1,
```

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```
I),X9,1):B$=B$+" "+A$:PRINT@192,
B$;:XB=800:GOSUB1450:NEXT X9:X9=
400 ' *** VERBALLY SPELLS OUT WO
RD WITH TIMED DELAY AFTER EACH L
ETTER
880 PRINT@293,W$(1,I);
890 A$=W$(2,I)+"  NOW REMEMBER T
HAET":GOSUB1430 ' *** REPRONOUNC
ES WORD AFTER SPELLING OUT VERBA
LLY
900 B$="":RETURN
910 POKE65494,0:GOSUB1000 ' ***
TEST IS COMPLETE -->SUMMARIZE RE
SULTS
920 A$="CONGRATULATIONS":PRINT@3
92,A$;:GOSUB1430
930 A$="U COMPLEETED THEE TEST":
GOSUB1430
940 PP=FIX(P+.5):PRINT@448,USING
 Z$;S,T,P
950 EN=S:GOSUB1190:S$=E$
960 EN=T:GOSUB1190:T$=E$
970 EN=PP:GOSUB1190:PP$=E$
980 A$="YOUR SCORE IS "+S$+"  UV
 A POSSIBLE "+T$+" 4 A FI NUL GR
ADE UV "+PP$+" PERCENT":GOSUB143
0
990 END
1000 CLS:SOUND200,1:RETURN ' ***
 CLS WITH BEEP
1010 ' *** CONGRATULATORY REMARK
S
1020 C$(1)="OUT STANDEENG"
1030 C$(2)="VERY GOOD  KEEP GOEE
NG"
1040 C$(3)="YOUR ABOUT REDDEE 4
THE NEXT LEFVEL NOW"
1050 C$(4)="SEEMS LIKE U HAFVE T
HAT 1 DOWN NOW"
1060 C$(5)="WAY 2 GO  FAR OUT EA
RTHLEENG"
1070 C$(6)="DARTH VAIDER ONLY WI
SHEZ HE COULD SPELL THAET WELL"
1080 C$(7)="WILL MIRRAKULLS NEFV
ER SEESS"
1090 C$(8)="NOW THATSS THE WAY 2
 DO THIS GAME"
1100 ' *** CHIDING REMARKS
1110 D$(1)="HOO R U TRYEENG 2 KI
D THIS IZ SERIOUS BIZZENESS"
1120 D$(2)="I CAN C WE R GOEENG
2 HAFV 2 WORK ON THIS 1"
1130 D$(3)="ARNT U ABOUT REDDY 2
 TRY 4 REEL"
1140 D$(4)="NOPE  TRY AGGIN"
1150 D$(5)="KEENG UV THE SPELLIN
G BEEZ YOUR NOT"
1160 D$(6)="I WOE NNT COUNT THAE
T 1 IF U GIFV ME 5 BUCKSS"
1170 D$(8)="I CAN DO BETTER THAN
 THAET WITHOUT PRO GRAMMING"
1180 RETURN
1190 ' *** ROUTINE TO PRONOUNCE
NUMBERS > 9 PROPERLY
1200 ED=FIX(EN/10):ER=FIX(EN-10*
ED+.5)
1210 IF ER=0THEN ER$=""ELSE ER$=
STR$(ER)
1220 IF ER=0AND ED=1THEN E$="TEN
":RETURN
1230 ON ED GOTO1250,1320,1330,13
40,1350,1360,1370,1380,1390,1400
1240 ED$="":GOTO1410
1250 ON ER GOTO 1260,1270,1280,1
290,1300,1310,1310,1310,1310,
1260 E$="ELEVEN":RETURN
1270 E$="TWELVE":RETURN
1280 E$="THIRTEEN":RETURN
1290 E$="FOURTEEN":RETURN
1300 E$="FIFTEEN":RETURN
1310 E$=ER$+"TEEN":RETURN
1320 ED$="TWENTY":GOTO1410
1330 ED$="THIRTY":GOTO1410
1340 ED$="FORTY":GOTO1410
1350 ED$="FIFTY":GOTO1410
1360 ED$="SIXTY":GOTO1410
1370 ED$="SEVENTY":GOTO1410
1380 ED$="EIGHTY":GOTO1410
1390 ED$="NINETY":GOTO1410
1400 E$="1 HUN DRED":RETURN
1410 E$=ED$+" "+ER$:RETURN
1420 XB=99*LEN(A$):GOTO1450 ' **
* VARIABLE DELAY FOR STATED WORD
1430 XB=60*LEN(A$):GOTO1450 ' **
* VARIABLE TIME DELAY
1440 XB=1000 ' *** MEDIUM DELAY
1450 POKE65494,0 ' *** SPEECH SU
BROUTINE FROM TANDY'S SS/C MANUA
L
1460 X=&HFF00:Y=&HFF7E
1470 IF A$=""THEN A$=" "
1480 POKE X+1,52:POKE X+3,63
1490 POKE X+35,60
1500 POKE 65407,34 ' *** TOGGLE
MULTI-PAK SLOT TO SS/C
1510 FOR M=1 TO LEN(A$)
1520 IF PEEK(Y) AND 128=0THEN 15
20
1530 POKE Y,ASC(MID$(A$,M,1)):NE
XT M
1540 IF PEEK(Y) AND 128=0THEN 15
40
1550 POKE Y,13:POKE65407,51:POKE
65495,0
1560 FOR X9=1TO XB:NEXT X9:XB=40
0:RETURN ' *** PROGRAMMED DELAY
1570 Y$=INKEY$ ' *** STROBE KEYB
OARD
1580 Y$=INKEY$:IF Y$=""THEN1580E
LSE RETURN
```

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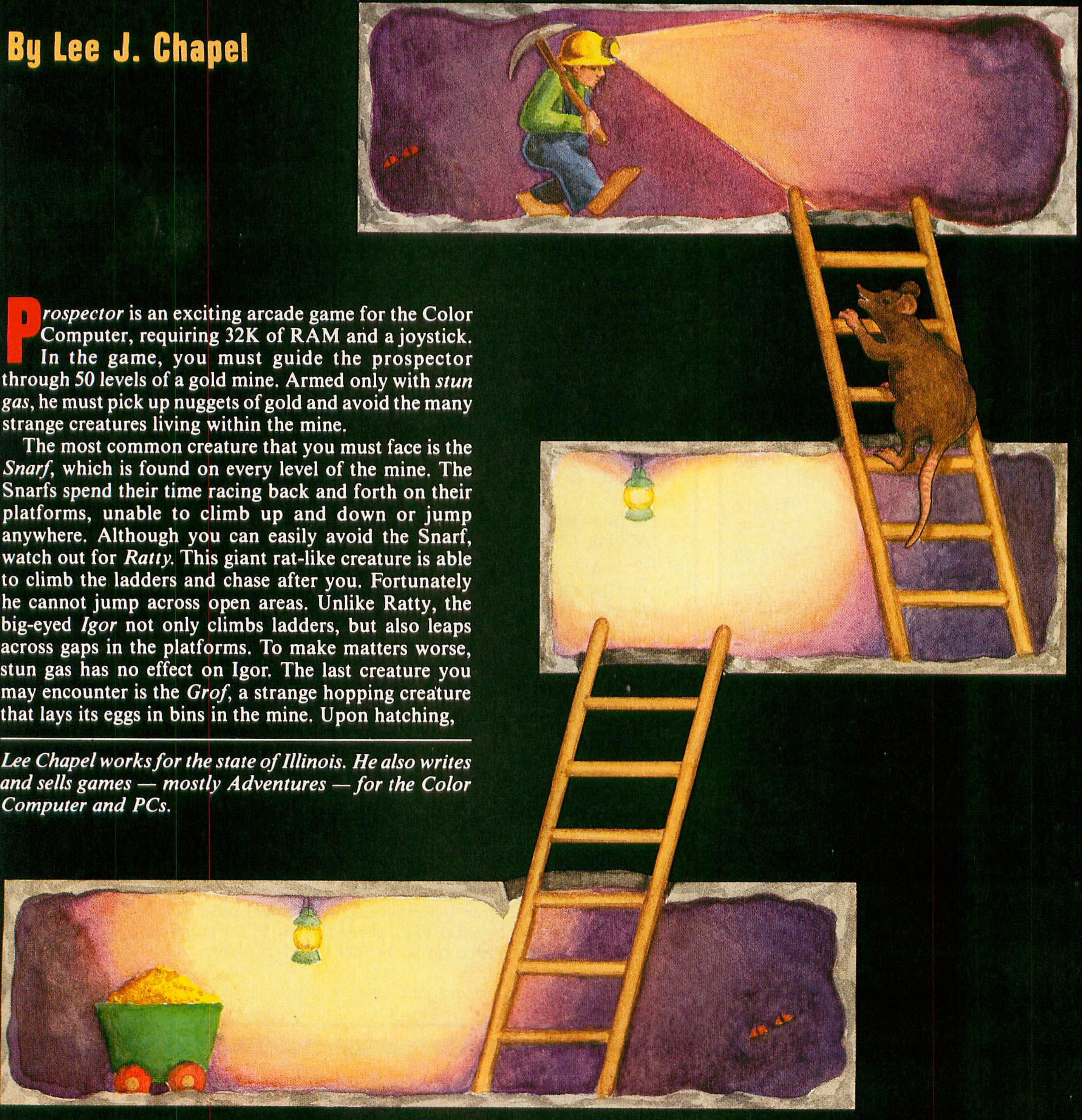
For the Love of Gold

By Lee J. Chapel



Prospector is an exciting arcade game for the Color Computer, requiring 32K of RAM and a joystick. In the game, you must guide the prospector through 50 levels of a gold mine. Armed only with *stun gas*, he must pick up nuggets of gold and avoid the many strange creatures living within the mine.

The most common creature that you must face is the *Snarf*, which is found on every level of the mine. The Snarfs spend their time racing back and forth on their platforms, unable to climb up and down or jump anywhere. Although you can easily avoid the Snarf, watch out for *Ratty*. This giant rat-like creature is able to climb the ladders and chase after you. Fortunately he cannot jump across open areas. Unlike Ratty, the big-eyed *Igor* not only climbs ladders, but also leaps across gaps in the platforms. To make matters worse, stun gas has no effect on Igor. The last creature you may encounter is the *Grof*, a strange hopping creature that lays its eggs in bins in the mine. Upon hatching,

---

Lee Chapel works for the state of Illinois. He also writes and sells games — mostly Adventures — for the Color Computer and PCs.

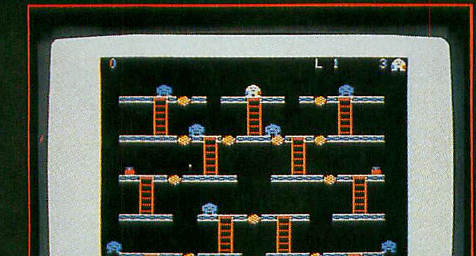
Grofs come bounding out of the bins, dropping through the gaps in the platforms and falling downward into the mine's depths.

Loading the Game

Before you can play *Prospector*, you must type in the five BASIC program listings (`PROS1`, `PROS2`, `SCRN1`, `SCRN2` and `MAKEPROS`), save them to disk or tape, and run them in order (see the "Up and Running" sidebar at the end of this article for step-by-step instructions). `PROS1` and `PROS2` poke into memory the routines that run the game and save them to tape or disk. `SCRN1` and `SCRN2` poke in the 50 available screens and save them. Finally, `MAKEPROS` loads the binary files created by the other four programs, places them in their proper memory locations, and saves everything to tape or disk as `PROS.BIN`.

Before running the programs, type `PMODE 0:PCLEAR 1` and press ENTER. If you do not, you may get an FC Error when you try to run them. CoCo 3 users should type `WIDTH 32` before running any of these programs, or the computer may lock up when they are run.

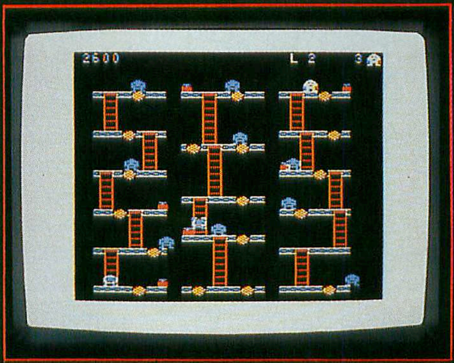
When `SCRN1` and `SCRN2` are run, a hexadecimal number is printed. Use the number as a check to see if you entered the correct number of values. `SCRN1` should print "66B4" and `SCRN2` should print "76FB" when you run the programs. These numbers are also important if you choose to create your own screens (explained in detail later in the article).



Running the Program

Once saved to tape or disk, `MAKEPROS` allows you to execute *Prospector*. To run *Prospector* after this process, type either `LOADM "PROS"` (for disk) or `CLOADM "PROS"` (for tape) and press ENTER. Once it is loaded, type `EXEC` and press ENTER.

When *Prospector* starts, the screen will clear to either an orange or a blue background. If the screen is blue, press the reset button until it turns orange. Once the screen is orange, press the fire button on the right joystick. The title screen will appear. Choose between a regular or a practice game by using the joystick and then pressing the fire button.



To move the prospector, use the right joystick. Pressing the fire button causes him to jump in the same direction he is moving. To pick up a gold nugget, place the prospector directly over the nugget, move down and then back up. Each nugget is worth 50 points. When you have gathered up all the gold, an orange exit platform will appear somewhere on the screen. When you move the prospector onto this platform, you will go on to the next level.

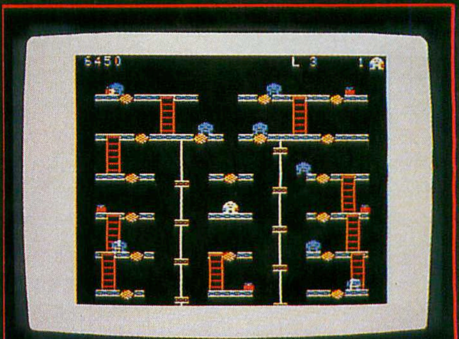
On each level, creatures will be moving about — usually trying to catch you. Coming into the slightest contact with one of them means falling to your death. Located at various places on each level are stun bombs. If the prospector touches a bomb, a gas is released into the air that temporarily stuns most creatures. These bombs are worth 100 points each.

If the screen does not change after the prospector dies or completes a level, make sure your joystick is centered. Once it is centered, the screen will change and the game will continue. (This keeps your prospector from an accidental fall at his starting position on the next screen.) *Prospector* has 50 different levels. Upon each completion of the 50th level, you will return to Level 1. Careful! The creatures will have grown smarter and faster.

You are awarded a new prospector every 10,000 points. If, when you lose your last prospector, you have a new high score (and were not playing a practice game), you will be asked to enter your name. You can pause the game by pressing CLEAR. Pressing ENTER allows the game to continue. If you want to stop the game, press BREAK.

A special feature of *Prospector* is the practice game. This feature allows you to go to any of the 50 levels with 1 to 99 prospectors and with creatures at any combination of three speeds and levels of intelligence. At the title screen, you will be given a choice between a practice and a regular game. If you want to play a practice game, point the joystick to "Practice," and press the fire button. The practice game setup screen will appear. Use the joystick to make your selections of number of men, level, and creature speed and intelligence. Press the fire button when your choice is highlighted. After choosing the creatures' intelligence, you will be placed on the selected level.

Remember: Any high score you make in a practice game does not count. Only a high score made while playing a regular game is posted.



Creating New Screens

Creating new and interesting screens for *Prospector* is almost as fun as playing the game. Designing a screen is relatively simple; there are only 15 basic building blocks that go into creating it.

The screen is divided into a grid of 19 rows and 64 columns. In screen design, nothing may be placed in the first two rows (although items can jump up into them), so only the lower 17 rows need to be figured out and encoded.

Each creature, platform, and other item occupies one to three columns on a row. The information on an item is contained in a hexadecimal byte. The low nibble (right half) of the byte identifies the item, and the high nibble (left half) contains any special information for that item (such as length, direction, or type.) Table 1 gives each item's value and defines each high nibble. (I usually store the length of an item in the high nibble when the high nibble has no meaning. This makes it easier to keep track of a row's length.)

Look at Line 110 in `SCRN1`. You can use Table 1 to see how Level 1's screen was created. Line 110 begins with `70`, which shows that there are 7 blank columns. The next data in Line 110, `3D`, identifies a Snarf as the next item. The Snarf takes up three columns. Next, `F0` and `10` identify 16 blank columns. The `39` is the prospector, who takes up 3 columns. Next come 16 more blank columns (`F0, 10`). The next three columns (`3D`) hold a Snarf. The `0` identifies the end of the first line and the start of a new line.

The next `DATA` line for Screen 1, Line 120, contains more information than the first one. The line begins with `71`, which identifies a platform seven columns in length. Next comes the top of a ladder (`36`) which takes up three columns. After the ladder, come two more platform sections (`21`), a gold nugget (`32`) and three platform sections (`31`). The `37` indicates where the screen's exit platform will appear. The exit is followed by five platform sections (`51`), a ladder top (`36`), five platform sections (`51`) and three blank areas (`30`). Following this, we find three platform sections (`31`), a gold nugget (`32`), two platform sections (`21`), a ladder top (`36`), and seven final platform sections (`71`). The final `0` indicates the end of the line.

When creating a screen, there are several points to remember. First, there should be a gap of at least four blank columns at both the right and the left sides of a row. The program automatically places four blank columns at the start of a line (which is why the second `DATA` line for Screen 1 begins with a platform), but you must not place items in the last four columns. Just remember that you can work with only 56 columns. (You can, if you want, let the Grofs jump into the first or last four blank columns.)

Make sure you have a player and an exit on each screen. You should also have at least one Snarf on each screen. Table 1 gives the minimum and maximum numbers of each item allowed. Items with no minimum or maximum have no limits. All ladders must have a top, or the prospector will have trouble climbing on and off them.

If you put teleportation devices on a screen, there must be two — and only two — of them. If you want an elevator on a screen, indicate only the elevator's top and bottom. Make sure the top and bottom of the elevator line up, or you could have an elevator that stretches throughout your machine's memory. Depending on where you place the elevator, you may need to add an extra line for the elevator's bottom. (Screen 3 is an example of a screen that contains this extra line.)

Because of the way this program works, you should not have a floater pass in front of an exit location. You should also keep the Grofs from hopping in front of the exit location.

Grofs are the trickiest item to set up. Examine a screen with them on it, like Screen 6, to see the path they take when hopping. When you put Grofs on a screen, make sure they won't hit any creature, elevator, or floater. Planning a Grof's route incorrectly can result in Grofs jumping all over the screen — and sometimes all over memory, which will cause your computer to crash.

The following is an example of the path that Grofs follow. B is the Grof bin; X is the Grofs' path; G is gold; and P is a platform:

```
PPPPPPPPGGGPPPPPPPPPPPPPP
    XXX     XXX
  XXX XXX XXX XXX
  BBB   XXX     XXX
PPPPPPPPPPPPPPP XXX PPPPP
                XXX
```

The example would be coded as: `81, 32,E1,0,0,0,20,3C,0,F1,50,51,0`.

When placing Igor on a screen, make sure he won't jump into an area where the Grofs are hopping. You should also make the gaps on either side of an elevator wide enough (at least 11 blank columns, including 3 for the elevator), so he won't try to leap across there.

Before attempting to construct your own screens, carefully examine the screens and compare them with the program listings for `SCRN1` and `SCRN2`. To do this, hold down the CLEAR key before the screen is displayed. This will cause all objects to pause immediately after the screen is drawn and prevent them from leaving their starting points.

To create your own screens, first draw your screen on a piece of paper to figure out where everything goes. Write down the screen information, and load the file `SCRN1`. The first time you create your own screens, delete Line 110 and all lines following by typing `DEL 110-` and pressing ENTER. Now type in your own screen information, starting at Line 110. If this is not your first attempt at screen-making, start wherever you last stopped. Remember to end the data for each screen with an `FF`, which indicates the end of the screen. Next, make sure the *last line* in the program contains only `DATA 0F`. (The `0F` indicates the end of the screen data and should be used only once, in the very last `DATA` statement.) Rename the program and save it to tape or disk, (e.g., `SAVE "MYSCRN1"`).

Now run the program. Your screen or screens will be poked into memory and saved to tape or disk. Make a note of the hexadecimal number the program prints. Next load `MAKEPROS` and edit all the lines containing `76FB`. Change all `76FB`s to the number printed when you ran `SCRN1`. If `SCRN1` contains your only screens, delete the `LOADM"SCRN2"` statements. You may want to change `PROS` to another name to distinguish the program from the original *Prospector*. Once you've made the changes, run the program. A new version of *Prospector* containing your screens will then be created and saved to tape or disk.

You will probably want to use the

Low Nibble	Item	Length	Min.Max.	Meaning of High Nibble
0	Blank	1		Quantity (1-F)
1	Platform	1		Quantity (1-F)
2	Gold Nugget	3	At least 1	None
3	Elevator	3	0,1 of each	0=Up, otherwise Down
4	Floater	3	0,6	0=Move Left, otherwise Right
5	Teleporter	3	0 or 2	None
6	Ladder	3		If not 0, top of ladder
7	Exit	3	1	None
8	Gas Canister	2	1,10	None
9	Player	3	1	None
B	Igor	3	0,1	None
C	Grof Bin	3	0,1 of each	0=Hop left, otherwise Hop right
D	Snarf	3	1,10	None
E	Ratty	3	0,1	None
F	End of screen			0=Last screen, F=End of screen

Table 1

practice game feature to look at and try out your screen. Be careful when picking the screen to play. If you choose a screen number higher than the last screen you created, the program will usually crash.

By the time you have created 25 to 30 screens, you will be almost out of memory in SCRN1. SCRN2 must then be used for the remaining screens. First run SCRN1 and make a note of the hexadecimal number it prints. Then load SCRN2 and change the 66B4s to that number. If the number is less than 6,600, you will also have to change the &H65FF in Line 10 to a number less than the number SCRN1 printed.

Delete the unwanted screen information from SCRN2 and type in your own screen data. When the program runs, make a note of the hexadecimal number it prints. You must replace the 76FBs in MAKEPROS with this number.

Although you could create more than 50 screens, the practice game feature is set up only for screens 1 through 50. To see any screens above 50, you must first play all preceding screens. Additionally, if the number SCRN2 prints is higher than 7FFF, you've used up all available memory. If this happens, you must delete screens until the number printed drops to 7FFF or lower.

It takes a lot of work to come up with a good screen. It's best to start simple, with just a few Snarfs, gold nuggets, platforms, and ladders. Once you see how things work, you can try creating more complex screens. In fact, before long, you may find that you've created 50 screens of your own to play.

(Questions or comments may be directed to the author at 2349 Wiggins Ave., Springfield, IL 6270. Include an SASE when requesting a reply.

Up and Running

Disk Users

1)Starting with a freshly formatted disk, type in each program and save it using the indicated filename.

2)Enter PMODE0:PCLEAR1.

3)Run the programs in the following order: PROS1, PROS2, SCRN1, SCRN2 and MAKEPROS. In each case, press D when prompted for tape or disk. (Each of the four BASIC programs save a machine language file to disk or tape. MAKEPROS ties the four ML programs together and saves the complete game using the filename PROS.)

4) You should now have a working copy of *Prospector.* You will be given the opportunity to run the program at this time. To run it in the future, simply put this disk in the drive and enter LOADM"PROS":EXEC.

Tape Users

1) To make things easier, get three blank tapes and label them Tape A, Tape B, Program Tape.

2) Put Tape A in the tape recorder. Now, type in all of the listings and save them in order PROS1, PROS2, SCRN1, SCRN2 and MAKEPROS on the tape.

3) Enter PMODE0:PCLEAR1.

4) Rewind Tape A, then type CLOAD"PROS1" and run it.

5) When prompted to save to disk or tape, put Tape B in the recorder, press Record and Play, then answer the on-screen prompts. When the data has been saved, put Tape A back in the recorder. Do *not* rewind Tape B.

6) Follow steps 4 and 5 for PROS2, SCRN1 and SCRN2 so that the data from each of these programs is saved in order on Tape B.

7) Load MAKEPROS from Tape A and run it. When prompted for the source tape or disk, put Tape B in the recorder, press Play and follow the prompts. MAKEPROS will load the four ML files and arrange them in memory. (Each of the first four BASIC programs save a machine language file to tape or disk. MAKEPROS ties the four ML programs together and saves the complete game using the filename PROS.

8) When prompted for a tape on which to save the completed program, put the Program Tape in the recorder, press Play and Record, and follow the prompts.

9) You should now have a working copy of *Prospector.* You will be given the opportunity to run the program at this time. To run it in the future, simply put this tape in the recorder and enter CLOADM"PROS":EXEC.

CoCo 3 and RGB

This program is written for the artifacting PMODE4 screens. Because of this, you will not see the game played in color on the CoCo 3 if you are using an RGB-only monitor. Once you have a complete, executable copy of *Prospector*, you can use *Patch* (February 1988, Page 114) to wllow you to play the game in color. Keep in mind, the resolution will be decreased. Also, you will not be able to read the text screens used in *Prospector.* Therefore, you may find it best to wait until you are familiar with the game before using *Patch* to play the game in color.

Editors Note: For your convenience, this month's RAINBOW ON TAPE/DISK includes the complete machine language file, PROS, just before the individual BASIC listings. ☐

120	204	560	48
160	88	610	73
210	208	660	212
260	217	710	52
310	72	760	199
360	178	810	240
410	158	860	166
460	5	910	129
510	114	END	109

Listing 1: PROS1

```
10 PCLEAR1:CLEAR50,&H61FF
20 PRINT"WORKING..."
30 A=&H6200:FORI=100TO184:C=0:FO
RJ=1TO50:READM:POKEA,M:C=C+M:A=A
+1:NEXT:READM:IFC<>M THENPRINT"C
HECKSUM ERROR IN LINE"I:PRINT"WA
S"C"SHOULD BE"M:END
40 CS=CS+C+M:NEXT:IFCS<>835250TH
ENPRINT"OVERALL CHECKSUM BAD.":E
ND
50 INPUT"SAVE TO (T)APE OR (D)IS
K";A$:A$=LEFT$(A$,1):IFA$="D"ORA
$="d"THEN80ELSEIFA$<>"T"ANDA$<>"
t"THEN50
60 INPUT"PRESS ENTER WHEN TAPE I
S READY";B$
70 CSAVEM"PROS1",&H6200,&H729A,0
:GOTO90
80 SAVEM"PROS1",&H6200,&H729A,0
90 PRINT"OKAY, NOW RUN PROS2":EN
D
100 DATA 26,80,142,77,57,111,128
,140,77,63,38,249,142,50,17,159,
114,18,26,80,127,255,64,127,255,
32,127,255,222,134,60,183,255,35
,16,206,128,0,142,2,0,204,85,85,
237,129,140,26,0,37,5362
110 DATA 249,189,71,250,182,255,
0,132,1,38,249,189,57,165,142,50
,69,159,114,16,206,128,0,189,58,
37,142,84,0,191,75,115,134,4,183
,75,131,74,183,75,126,183,75,120
,134,64,183,75,128,134,5883
120 DATA 16,183,77,50,134,1,183,
75,119,142,0,43,16,142,74,22,189
,58,58,142,0,73,189,58,58,142,0,
103,189,58,58,142,1,10,189,58,58
,142,1,34,189,58,58,189,58,51,14
2,77,57,79,4245
130 DATA 170,128,140,77,63,38,24
9,186,75,103,39,46,142,0,161,16,
142,74,136,189,58,58,142,0,193,1
89,58,58,142,0,173,16,142,77,62,
189,58,72,142,0,205,16,142,77,56
,189,58,72,142,0,4960
140 DATA 186,16,142,75,96,189,58
,58,189,72,21,95,52,4,173,159,16
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134,96,183,29,69,198,255,134,94,
183,29,89,32,11,134,96,183,29,89
,95,134,94,183,4870
150 DATA 29,69,182,255,0,132,1,3
8,209,247,75,103,189,57,165,246,
75,103,16,39,0,211,189,58,37,16,
142,74,158,142,0,6,189,58,58,142
,0,97,189,58,58,142,0,161,189,58
,58,142,1,9,4872
160 DATA 189,58,58,142,1,36,189,
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132,189,58,58,173,159,160,10,182
,75,120,246,1,90,193,8,36,9,139,
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6,37,7,139,1,4513
170 DATA 25,38,2,134,1,183,75,12
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76,38,208,189,57,165,173,159,160
,10,182,75,119,246,1,90,193,8,36
,9,139,153,25,38,17,134,80,32,13
,193,56,37,9,139,4844
180 DATA 1,25,129,81,38,2,134,1,
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,189,57,176,38,206,182,75,119,14
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93,255,39,245,32,248,191,75,115,
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190 DATA 189,57,193,247,75,126,9
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200 DATA 142,75,42,189,58,58,182
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210 DATA 132,132,64,38,10,134,25
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164,48,35,189,68,204,49,47,106,2
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220 DATA 254,75,171,39,6,142,75,
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3,204,1,1,237,132,237,2,237,4,19
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22,75,136,38,5162
250 DATA 62,52,16,190,75,123,204
,9,9,237,132,237,2,237,4,252,75,
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,7,74,129,7,16,36,1,98,182,1,90,
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1,75,121,189,70,234,189,73,221,1
89,65,47,189,68,164,32,5876
400 DATA 225,198,20,52,4,189,71,
0,189,65,47,106,228,38,246,53,4,
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Reviewed in RAINBOW, February 1988.

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169,0,133,129,8,38,20,182,75,187
,38,10,3705
```

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★ 5 STAR FINAL **DECEMBER '88** **COLD**

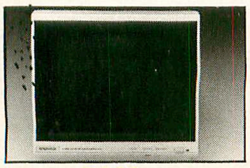
HMC CUTS 515 to $266

Hundreds of $ off Monitors sighted as Major Factor. HMC is reported to have made a special purchase on Magnavox monitors. These items, listed, are being offered at remarkable savings.

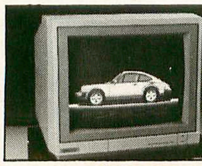
MAGNAVOX 7622 12″ Amber Screen offers 900 dots × 350 lines resolution at 20 MHz on a dark glass anti-glare CRT with built-in audio and 1 year warranty. ($7 shipping) **$88** 7652 green screen also available $88

MAGNAVOX 8 CM 515 has analog RGB for CoCo 3, TTL RGB for Tandy 1000 or IBM PC's, and composite color for CoCo 2 and 3. Built-in speaker. 14″ screen with 640 dot × 240 line resolution. Plus 2 years parts and labor warranty. reg. list $499 **was $298** **$266** + $14 Shipping

CC-3 Magnavox RGB cable only $19.95 with Magnavox Monitor order. $29.95 w/o monitor.



7622



8CM515

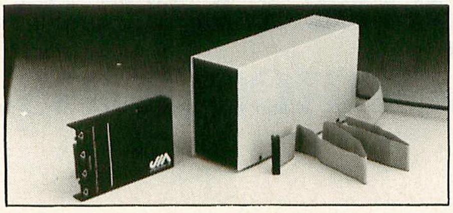
123A

123A 12″ This 12″ green screen high resolution monitor offers 80 column capability, Zenith quality and a 90-day warranty valid at any of Zenith's 1200 locations. Retail $199. **Our price $67.50** ($7 shipping) **REPACK**

VA-1 for monochrome and color monitors delivers video interface for CoCo's 1 & 2 **$29.45** ($2 shipping)

DRIVE Ø +. ***Howards Drive Ø*** gives you a DD-3 MPI drive, a CA-1 cable and a HDS DC-5 Disk Controller for only **$178.45.** Double sided double density 360K. ($5 shipping)

No charge for Disto DC-3 upgrade



HMC's Guarantee– A Promise you can take to the Bank.

Howard Medical's 30-day guarantee *is meant to* eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatibility. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back (less shipping.) Shipping charges are for 48 states. APO, Canada and Puerto Rico orders are higher.

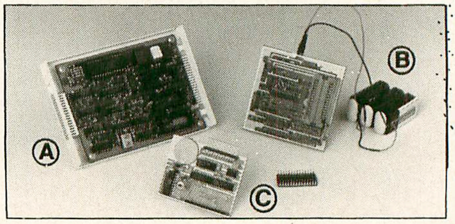
Price Break on DISTO Disk Controllers

Includes controller and C-DOS 4.0 ROM Chip. **DISTO $75** DC-3 [A]
($2 shipping on all DISTO products)

ADD-ON BOARDS

DC-3P Mini Eprom programmer includes all software to program 2764 or 27128 chips [B] **$55**

DC-3C Clock Calendar and parallel printer port [C] **$40**



RS-232 **$49.95**

Replaces R.S. RS-232 board. Plugs in drive port or multi pack. 2 MHz operation works with OS-9.($2 ship)

3 in 1 Board **$59.45**

Clock calendar at 2 MHz parallel printer port pack requires DISTO Controller or MEB ($2 ship)

MEB **$30** ($2 ship)

Plugs into multi pak to expand DISTO DC-3 bus. Use clock in DC-3 and eprom programmer in MEB.

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NEW — DISCOVER CARD

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New CoCo 3 Utilities

Great for 512K Systems! From Color Venture and OWL-WARE

PRINTER LIGHTNING

A great print spooler which gives you 44K print buffer from a 128K CoCo and up to 438K (200 pages!) from a 512K CoCo. With this spooler you can run a program while you are printing a file. The spooler does not slow down the computer to any noticeable extent while you are running a second program and no lost characters arise. Baud rates selectable. *Printer Lightning* can reside in memory along with *RAMDISK*!

RAMDISK

Using 512K CoCo 3 you have access to 2 additional disk drives in RAM. All disk commands are supported, and the data are Reset button protected. You can now have up to 5 disk drive capacities on line at once and can assign the ram disks to any drive number. By making the ramdisk Drive 0, all programs which require a lot of drive access will run much faster. You can have the *RAMDISK* in memory at the same time as the *Printer Lightning*!

BACKUP LIGHTNING

This program is the fastest way to make backup copies of your files using a 512K CoCo. You can backup 35, 40, or 80 track disks single or double sided. Both RS and OS-9 disks may be backed up. The original disk is saved to memory and a copy can be made on an *unformatted disk* every 45 seconds! The lightning read, write, format, and verify routines that were developed make this program much quicker that RSDOS or OS-9 for backups. This will become one of your most used programs!

·NEW·NEW·

Only $19.95 each. 3 for $39.95.

SPECIAL With our 512K Upgrade (Next page) only $2. each or 3 for $5!

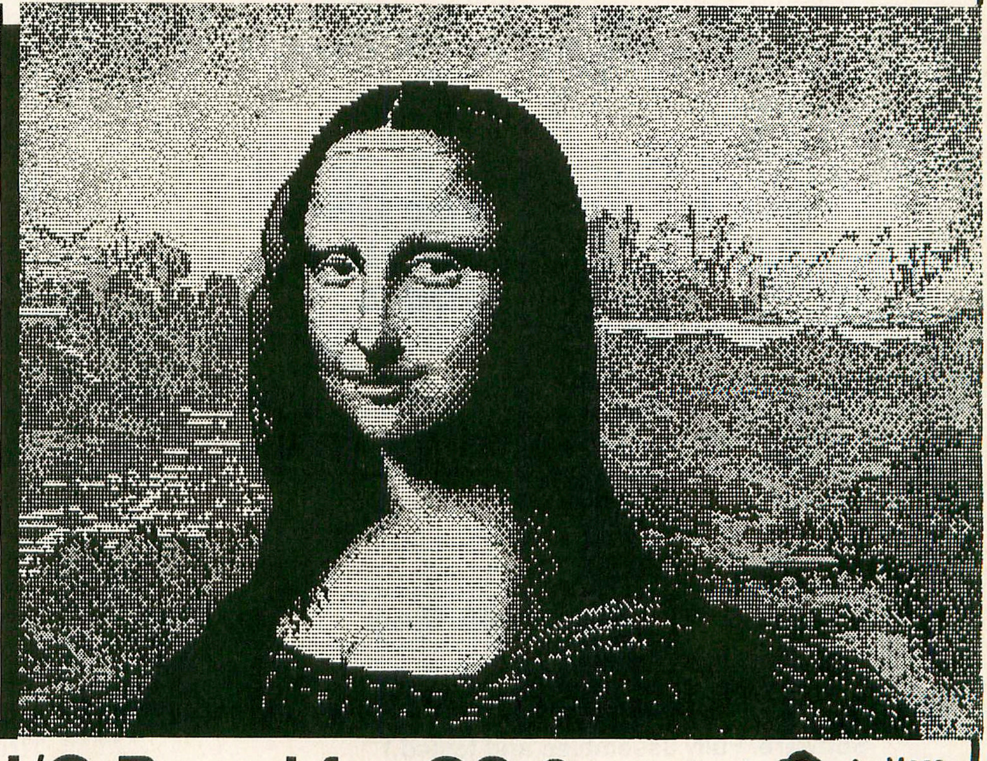
Announcing:

The finest graphics/drawing program for the COCO 3!

Da Vinci 3

- 16 colors on screen at one time
- Modify each color from 64 available colors
- Use composite or RGB monitor
- Draw with custom paintbrushes
- Full resolution 320 X 192
- Picture converter for conversion of COCO 2 pictures to COCO 3
- Multiple text fonts
- Accepts input from joystick, X-pad, mouse, or touch-pad
- Boxes, circles, line, paint generation
- Screen dump for Tandy mono and color ink-jet printers, (NX-10 and others pending)
- Sensible price
- No additional hardware required because of course/fine joystick movement modes
- Zoom mode for individual pixel editing
- Great on screen menu which is removable at the touch of a key to allow full screen edit

128K or 512K COCO 3 $37.95



Super I/O Board for OS-9

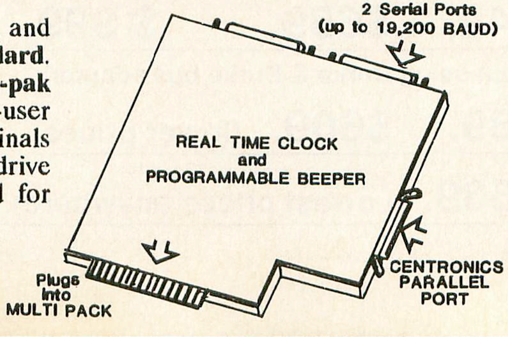
Each Board Provides 2 Serial Ports and Centronics Parallel Port

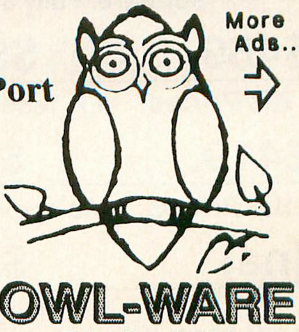
First Board has Real Time Clock and Beeper... With Second Board up to 5 Users

The serial ports are usable **up to 19,200 Baud**, and the parallel port is a **true Centronics standard**. Plug into your multi-pak. **On CoCo 3, multi-pak must be upgraded**. You will have a multi-user system with additional computers or terminals plugged into the serial ports. An OWL hard drive and 512K upgrade are strongly recommended for multi-user systems.

Intro Price... $169.

BOARD 2...$145.





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(215) 682-6855 (PA)

OWL-WARE

Proven

On the Razor's Edge of

Basic and OS-9 Hard Drive Systems

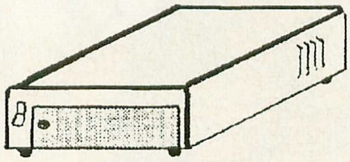
Proven Performance for Demanding Home or Business Users

Every hard drive which has been produced by OWL-WARE during the last 3 years is **complete**. A system consists of software, hard drive, controller, heavy-duty power supply, and LR Tech Interface. There are no hidden costs for assembly or testing. When a drive system is ordered, we fully **assemble**, **test**, and **burn-in** the system for 3 full days. This ensures dependability and optimum performance.

We have now been supplying CoCo hard drive systems and parts for more than 3 years. This is the longest history in the CoCo market of any system. Some other advertisers are stating that they have one of the most reliable systems for the CoCo *with all of 4 months history in the CoCo hard drive market*! We have reached our position in the hard drive market by providing our customers with a quality product that they (and we) can be proud to own and use.

Because of many requests for a lower price system in kit form, we are now selling a kit of all parts at a significant discount compared to our regular prices. We recommend this kit (or any kits offered by any other supplier) only to those who have experience in electronic assembly and OS-9.

For OS-9 Levels 1 and 2



10 Meg.	20 Meg.	40 Meg.	80 Meg. (2 X 40 Meg.)
System Prices: (Includes Hard Drive, Controller, LR Tech Interface, Software. Fully assembled and tested.)			
$469.	$599.	$725.	$1,069.
Kit Prices: (LR Tech System as above but not assembled or tested.)			
$419.	$549.	$659.	$ 999.
Kit Prices: (As above but using Burke & Burke bus adapter)			
(na)	$489.	$609.	(lower prices)

30 Meg Kit: $539. (Lowest prices anywhere)

OWL Hard Drive BASIC 3

There have been several ads in this magazine about BASIC for Color Computer hard drive systems. These ads sometimes only tell a part of the story. Our BASIC system price includes **assembly**, **testing**, and **3-day burn-in** period. We do not require a Multi-pak to operate.

Our hard drive systems are fast, reliable, and reasonable in price. This has been proven by hundreds of users over the past 3 years. We do not have to turn off error checking for speed. We achieve high speed BASIC from a unique indexing method.

The table below will summarize some of the key points about our BASIC hard drive system and two other systems. We believe that we have the best BASIC interface for CoCo hard drives available.

BASIC Hard Drive Systems*

Feature	OWL	B&B	RGB
Drive Portion Available	Entire	Entire(?)	Entire
User Sets BASIC/OS-9 Partitions	YES	Yes	No
Add to Existing OS-9 Drive Without Reformat	YES	Yes(?)	No
Drives 0-3 Hard/Floppy	YES	No	Yes
Built in Park	YES	No	Yes
Speed*	FAST	Fast	Fast

*All feature details are believed to be true at time of writing and are subject to change. We believe that our BASIC hard drives are the fastest due to our indexing method, but all three systems are fast. On ours all BASIC commands work including DSKINI, DSKI$, and DSKO$.

Prices: With/Without Hard Drive

$35./$79.

Technology

the Color Computer Frontier

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Bonus!
Special
Bundled
Software
with any
Disk Drive
Purchase!

Floppy Drive Systems

The Highest Quality for Service Now and for Years to Come

Use our WHISPER DRIVE for the finest, quietist drive

Drive 0 Systems (Half Height, Double Sided, Direct Drives) **$219.**

Drive 0 systems complete with drive, controller, legal DOS, cable, case, power supply, and manual

Drive 1 Systems (Half Height, Double Sided, Direct Drives) **$129.**

New 3.5", 720K Drives for OS-9 with case & Power Supply **$179.**

Drive 1 Systems have drive, case, power supply. (You may require optional cable and/or DOS chip to use)

Special for 0/1 Combos (Drives 0,1,2,3) $315.

HALF- HEIGHT DRIVE UPGRADES FOR RS HORIZONTAL CASES

Why only double the capacity of your system when you can triple in the same case? Kit includes: double-sided to fit your case, chip to run both sides of new drive, hardware, and detailed instructions. Easy! Takes only 5 minutes!

Model $119. Model $129.
500 501 or 502

All drives are new and fully assembled. We ship only FULLY TESTED and CERTIFIED at these low prices. We use Fuji, YE Data, and other fine brands. No drives are used or surplus unless otherwise stated to you when you order. We appear to be the one of the few advertisers in Rainbow who can truly make this claim. We have 5 years experience in the CoCo disk drive market! We are able to provide support when you have a problem.

Drives 1 Year Warranty

OWL Phones

Order Numbers (only)
1-800-245-6228
1-215-682-6855

Technical Help
1-215-837-1917

OWL WARE Software Bundle

Disk Tutorial/Utilities/Games

DISK TUTOR Ver 1.1

Learn how to use your disk drive from this multi-lesson, machine language program. This tutor takes you through your lessons and corrects your mistakes for a quick, painless disk drive introduction. (This professionally written tutor is easily worth the bundle's total price.)

OWL DOS

An operating system that gives faster disk access and allows the use of double-sided drives. Corrects a floating point number error on early CoCo systems.

COPY-IT

Quickly copies selected programs between disks. A wild card option selects groups of programs to copy.

VERIFY

Verifies reading of each sector. Bad sectors are listed on the screen.

2 GAMES

We will select 2 games from our stock. These sold for more than $20 each.

If sold separately this is more than $125 worth of software!!

Do not mistake this software with cheap, non-professional "Public Domain" software which is being offered by others. All of this software is copyrighted and professional in quality. The tutor is unique with us and has helped thousands of new users learn their disk drive.

only $27.95
(or even better)
only $6.95 with
any Disk Drive Purchase!!

Our prices include a discount for cash but do not include shipping.

OWL-WARE has a liberal warranty policy. During the warranty period, all defective items will be repaired or replaced at our option at no cost to the buyer except for shipping costs. Call our tech number for return. Return of non-defective or unauthorized returns are subject to a service charge.

OWL-WARE
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Mertztown, PA 19539

```
,134,124,75,134,198,3,61,16,142,
77,29,49,171,4773
920 DATA 239,164,53,4,134,1,196,
240,38,2,134,255,167,34,52,16,13
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,3,255,75,196,5433
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```

110	161	560	246
160	87	620	225
210	182	660	252
260	111	730	235
310	117	780	50
360	51	850	237
410	195	900	169
450	180	END	237
510	232		

Listing 2: PROS2

```
10 PCLEAR1:CLEAR50,&H61FF
20 PRINT"WORKING..."
30 A=&H629A:FORI=100TO184:C=0:FO
RJ=1TO50:READM:POKEA,M:C=C+M:A=A
+1:NEXT:READM:IFC<>M THENPRINT"C
HECKSUM ERROR IN LINE"I:PRINT"WA
S"C"SHOULD BE"M:END
40 CS=CS+C+M:NEXT:IFCS<>748254TH
ENPRINT"OVERALL CHECKSUM BAD.":E
ND
50 INPUT"SAVE TO (T)APE OR (D)IS
K";A$:A$=LEFT$(A$,1):IFA$="D"ORA
$="d"THEN80ELSEIFA$<>"T"ANDA$<>"
t"THEN50
60 INPUT"PRESS ENTER WHEN TAPE I
S READY";B$
70 CSAVEM"PROS2",&H629A,&H7334,0
:GOTO90
80 SAVEM"PROS2",&H629A,&H7334,0
90 PRINT"OKAY, NOW RUN SCRN1":CL
EAR50,&H7FFF:END
100 DATA 52,16,255,75,121,79,142
,78,206,126,67,53,129,11,38,27,2
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4,14,52,16,142,79,70,32,112,129,
12,38,37,183,75,189,5147
110 DATA 196,240,38,5,255,75,190
,32,3,255,75,192,52,16,134,1,183
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,189,69,85,53,2,32,80,129,13,38,
38,52,16,182,75,151,124,75,151,1
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120 DATA 75,231,48,139,239,129,1
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,255,231,132,134,13,142,77,162,3
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183,75,141,252,75,143,39,12,190,
75,145,189,69,197,204,4,4,189,70
,166,252,75,147,39,12,5766
160 DATA 190,75,149,189,69,197,2
04,3,3,189,70,144,57,182,75,139,
38,23,52,16,134,5,183,77,75,183,
77,77,189,73,221,134,10,183,77,7
7,189,73,221,53,16,134,10,183,75
,198,57,182,77,47,5354
170 DATA 39,36,74,183,77,47,129,
2,38,9,252,77,48,131,0,1,253,77,
48,134,3,176,77,47,198,20,61,142
,82,195,48,139,252,77,48,189,69,
85,57,189,65,47,173,159,160,10,2
52,1,90,129,4895
180 DATA 8,37,242,129,56,36,238,
193,8,37,234,193,56,36,230,57,18
2,75,189,39,22,16,142,76,125,238
,164,39,5,48,36,189,68,204,49,16
8,16,16,140,77,29,38,238,57,131,
28,0,89,73,57,4853
190 DATA 84,84,84,84,57,237,129,
237,129,237,132,129,5,39,9,48,13
6,124,237,129,237,129,237,132,57
,141,4,177,75,128,57,52,4,198,8,
182,77,73,72,72,72,184,77,73,72,
72,121,77,70,121,5401
200 DATA 77,71,121,77,72,121,77,
73,90,38,230,182,77,70,53,4,57,1
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230 DATA 32,198,5,166,128,168,16
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,52,38,189,68,236,230,97,196,3,3
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,39,85,189,70,244,5646
280 DATA 32,80,134,4,183,75,141,
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290 DATA 142,255,128,189,70,216,
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,36,5,134,255,183,75,139,204,4,4
,141,59,252,75,147,38,1,57,182,7
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300 DATA 5,188,75,149,37,5,134,2
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134,6,176,75,142,198,128,61,243,
75,147,190,75,149,191,75,113,32,
19,253,77,68,182,75,142,74,198,1
28,61,243,75,143,190,5991
```

★ ★ ★ NEW ★ ★ ★

BASH by Steve Bjork

Based on a popular arcade game which we can't mention (But sounds like "Art Gannoyed"). BASH challenges you to clear the screen by "BASHING" your ball through multiple brick layers. Of course you'll have help getting through this 20 level game by activating options like, Slow Ball, Expanded Paddle, Multi-Ball and more!

Reg $29.95 Introductory Special $24.95
Color Computer 3 only

★ ★ ★ NEW ★ ★ ★

WARP FIGHTER 3-D by Steve Bjork

Blast into Hyper-Drive with this fun-filled starship shoot-em-up! You'll have a captain's eye view out of your 3-D cockpit as you try to rid the galaxy of the evil enemy forces. Game includes 3-D glasses and works on any Color T. V., Composite or RGB monitor.

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310 DATA 75,145,191,75,113,52,6,
142,80,214,189,69,153,53,16,252,
77,68,237,132,237,2,237,4,31,16,
195,3,0,16,179,75,113,35,226,57,
16,191,77,68,141,12,252,75,121,2
43,77,68,253,75,5434
320 DATA 121,141,1,57,252,75,121
,142,78,206,189,69,153,57,142,1,
244,48,31,38,252,57,134,16,32,2,
134,5,52,52,142,77,51,95,169,132
,25,167,128,52,1,140,77,57,39,5,
79,53,1,32,4424
330 DATA 239,53,1,16,142,2,33,14
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7,50,38,245,32,38,230,132,189,68
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,52,132,240,177,77,50,38,26,182,
77,50,139,16,25,183,77,50,182,75
,120,129,153,39,10,139,1,25,183,
75,120,141,32,141,30,5027
350 DATA 53,52,57,52,48,142,82,1
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48,49,33,57,204,28,121,142,78,20
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,60,189,68,92,93,4986
360 DATA 39,4,141,205,32,11,111,
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,164,49,168,32,16,140,2,246,38,2
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202,183,255,204,183,255,192,183,
255,195,183,255,197,134,255,183,
7563
380 DATA 255,34,57,183,255,198,1
83,255,201,183,255,203,183,255,2
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,16,142,75,231,182,75,151,52,2,2
36,164,142,81,78,189,69,153,49,7
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390 DATA 47,106,228,38,242,53,2,
252,75,152,39,6,142,81,198,189,6
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,122,75,131,39,31,16,142,76,125,
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420 DATA 80,74,189,69,153,238,16
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2,12,189,68,97,49,168,16,16,140,
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5,132,141,25,38,22,4829
430 DATA 190,75,192,39,8,134,2,1
41,35,141,12,38,9,190,75,190,39,
4,134,254,141,22,57,16,142,76,12
5,236,164,39,11,49,168,16,16,140
,77,29,38,243,77,57,79,57,48,137
,255,0,230,132,4779
440 DATA 234,5,38,31,175,164,167
,34,134,6,167,35,238,164,48,36,1
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97,57,182,75,134,39,250,122,75,1
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450 DATA 135,16,142,77,29,52,2,2
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460 DATA 255,77,66,252,75,121,19
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470 DATA 35,53,2,74,16,38,255,15
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,182,255,3,132,247,183,255,3,182
,255,35,138,8,183,255,35,52,112,
16,190,77,74,206,77,78,166,192,3
9,13,132,252,183,255,6404
480 DATA 32,190,77,76,189,68,167
,32,239,49,63,38,232,53,112,57,8
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6,89,32,76,69,69,32,67,72,65,80,
69,76,0,40,67,41,32,67,79,80,89,
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490 DATA 73,71,72,84,32,49,57,56
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500 DATA 69,0,80,82,69,83,83,32,
70,73,82,69,32,66,85,84,84,79,78
,32,84,79,32,67,72,79,79,83,69,0
,72,73,45,83,67,79,82,69,58,0,76
,65,83,84,32,83,67,79,82,69,3324
510 DATA 58,0,80,82,65,67,84,73,
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,85,80,0,78,85,77,66,69,82,32,79
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,78,32,84,79,32,83,84,65,82,84,0
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,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
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570 DATA 0,0,0,0,0,0,0,0,0,0,0,0
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,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0
580 DATA 0,0,0,0,0,0,0,0,255,255
,255,255,255,255,255,255,255,255
,255,255,255,255,255,255,255,255
,255,255,255,255,255,255,255,255
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,255,255,255,255,12750
620 DATA 255,255,255,255,255,255
,255,255,255,255,255,255,191,255
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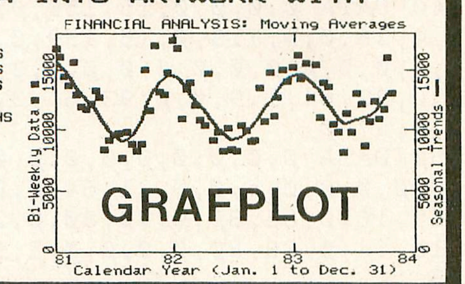

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,255,255,255,255,255,255,255,255
,255,255,255,255,191,255,255,255
,255,255,255,255,255,255,255,255
,255,255,255,255,255,255,255,255
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,49,83,124,170,219,0,0,240,128,3
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660 DATA 64,16,64,16,255,240,85,
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,3418
670 DATA 0,160,160,0,0,0,0,2,128
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,168,0,40,40,0,10,160,0,8,32,0,4
0,40,0,0,0,0,0,160,0,2,168,0,10,
170,0,8,162,0,10,2270
680 DATA 170,0,10,10,0,2,168,0,2
,8,0,10,10,0,0,0,0,0,40,0,0,170,
0,2,170,128,2,40,128,2,170,128,2
,130,128,0,170,0,0,130,0,2,130,1
28,23,0,93,128,119,96,2649
690 DATA 221,192,119,80,93,128,2
2,0,0,0,0,0,0,0,255,240,170,160,
170,160,170,160,255,240,0,0,0,0,
0,0,0,0,0,0,255,240,85,80,85,80,
85,80,255,240,0,0,0,0,0,0,4320
700 DATA 0,0,0,0,0,0,0,241,224,0
,241,224,0,42,128,0,170,160,0,13
8,32,0,170,160,0,160,160,0,42,12
8,0,160,160,0,0,0,0,60,120,0,60,
120,0,10,160,0,42,168,0,34,3514
710 DATA 136,0,42,168,0,40,40,0,
10,160,0,40,40,0,0,0,0,15,30,0,1
5,30,0,2,168,0,10,170,0,8,162,0,
10,170,0,10,10,0,2,168,0,10,10,0
,0,0,0,3,199,128,2006
720 DATA 3,199,128,0,170,0,2,170
,128,2,40,128,2,170,128,2,130,12
8,0,170,0,2,130,128,0,0,0,15,0,0
,63,192,0,118,224,0,255,240,0,24
9,240,0,191,208,0,191,208,0,57,1
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730 DATA 0,249,240,0,0,0,0,3,192
,0,15,240,0,29,184,0,63,252,0,62
,124,0,47,244,0,47,244,0,14,112,
0,62,124,0,0,0,0,0,240,0,3,252,0
,7,110,0,15,255,0,15,3444
740 DATA 159,0,11,253,0,11,253,0
,3,156,0,15,159,0,0,0,0,0,60,0,0
,255,0,1,219,128,3,255,192,3,231
,192,2,255,64,2,255,64,0,231,0,3
,231,192,96,96,0,144,144,0,4338
750 DATA 120,224,0,10,128,0,106,
224,0,202,176,0,138,144,0,31,128
,0,48,192,0,224,112,0,24,24,0,36
,36,0,30,56,0,2,160,0,26,184,0,5
0,172,0,34,164,0,7,224,0,12,48,3
496
760 DATA 0,56,28,0,6,6,0,9,9,0,7
,142,0,0,168,0,6,174,0,12,171,0,
8,169,0,1,248,0,3,12,0,14,7,0,1,
129,128,2,66,64,1,227,128,0,42,0
,1,171,128,3,2347
770 DATA 42,192,2,42,64,0,126,0,
0,195,0,3,129,192,0,0,0,0,0,0,0,
0,42,0,8,0,85,0,85,0,85,0,85,0,8
5,80,0,85,80,0,21,64,0,5,0,0,0,0
,0,0,1797
780 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,21,84,0,21,84,0,5,80,0,1,64
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,0,0,0,5,85,0,5,85,0,540
790 DATA 1,84,0,0,80,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,1,85,
64,1,85,64,0,85,0,0,20,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,570
800 DATA 0,0,0,0,5,0,0,21,64,0,6
9,16,0,85,80,0,80,80,0,21,64,0,5
,0,0,21,64,0,16,64,0,80,80,0,1,6
4,0,5,80,0,17,68,0,21,84,0,20,20
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810 DATA 80,0,1,64,0,5,80,0,4,16
,0,20,20,0,0,80,0,1,84,0,4,81,0,
5,85,0,5,5,0,1,84,0,0,80,0,1,84,
0,1,4,0,5,5,0,0,20,0,0,85,0,1010
820 DATA 1,20,64,1,85,64,1,65,64
,0,85,0,0,20,0,0,85,0,0,65,0,1,6
5,64,170,160,170,160,170,160,170
,160,42,128,42,128,42,128,10,0,1
0,0,10,0,249,240,0,23,16,0,3138
830 DATA 66,64,0,23,16,0,249,240
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,62,124,0,5,196,0,16,144,0,5,196
,0,62,124,0,0,0,0,0,0,0,0,0,0,0,
0,1592
840 DATA 0,0,0,0,15,159,0,1,113,
0,4,36,0,1,113,0,15,159,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,3,231,19
2,0,92,64,1,9,0,0,92,64,3,231,19
2,0,1790
850 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,5,0,0,21,64,0,85,80,0
,69,16,0,85,80,0,80,80,0,21,64,0
,16,64,0,80,80,0,0,0,0,1,64,0,10
55
860 DATA 5,80,0,21,84,0,17,68,0,
21,84,0,20,20,0,5,80,0,4,16,0,20
,20,0,0,0,0,0,80,0,1,84,0,5,85,0
```

```
,4,81,0,5,85,0,5,5,0,1,84,0,1,4,
1095
870 DATA 0,5,5,0,0,0,0,0,20,0,0,
85,0,1,85,64,1,20,64,1,85,64,1,6
5,64,0,85,0,0,65,0,1,65,64,0,0,0
,1,16,0,1,16,0,21,64,0,85,80,0,6
9,1263
880 DATA 16,0,85,80,0,80,80,0,21
,64,0,80,80,0,0,0,0,0,68,0,0,68,
0,5,80,0,21,84,0,17,68,0,21,84,0
,20,20,0,5,80,0,20,20,0,0,0,0,0,
17,0,1284
890 DATA 0,17,0,1,84,0,5,85,0,4,
81,0,5,85,0,5,5,0,1,84,0,5,5,0,0
,0,0,0,4,64,0,4,64,0,85,0,1,85,6
4,1,20,64,1,85,64,1,65,64,0,85,1
293
900 DATA 0,1,65,64,120,48,195,63
,3,198,103,231,192,204,120,231,4
8,6,102,102,6,96,192,204,255,48,
6,102,102,6,96,220,204,219,62,6,
102,103,199,192,204,252,195,48,6
,102,102,6,192,204,5827
910 DATA 204,195,48,6,99,198,6,9
6,120,204,195,63,3,193,135,230,9
6,48,72,72,72,72,72,48,32,96,32,
32,32,32,112,112,136,8,48,64,128
,248,112,136,8,48,8,136,112,16,4
8,80,144,248,4755
920 DATA 16,16,248,128,240,8,8,1
36,112,112,128,128,240,136,136,1
12,248,8,16,32,64,128,128,112,13
6,136,112,136,136,112,112,136,13
6,120,8,8,112,0,0,0,0,16,0,46,0,
85,0,112,0,107,4406
930 DATA 0,205,0,182,0,39,0,0,0,
6,48,203,192,52,128,208,48,127,1
92,18,0,11,176,48,0,28,128,192,1
92,10,48,15,240,60,0,195,240,97,
0,221,176,33,176,56,0,0,0,192,19
2,12,4386
940 DATA 0,192,48,3,0,12,0,0,192
,192,48,12,0,48,192,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,939
```

130	195	710	253
190	162	790	136
260	112	840	0
320	155	920	22
380	90	970	179
440	186	1050	232
520	151	1110	78
580	234	END	180
650	227		

Listing 3: SCRN1

```
10 PCLEAR1:CLEAR50,&H53FF:J=&H54
00
20 PRINT"WORKING..."
30 READA$:IFA$<>"0F"THENPOKEJ,VA
L("&H"+A$):J=J+1:GOTO30
40 PRINTHEX$(J)
50 INPUT"SAVE TO (T)APE OR (D)IS
K";A$:A$=LEFT$(A$,1):IFA$="D"ORA
$="d"THEN80ELSEIFA$<>"T"ANDA$<>"
t"THEN50
60 INPUT"PRESS ENTER WHEN TAPE I
S READY";A$
70 CSAVEM"SCRN1",&H5400,J+1,0:GO
TO90
80 SAVEM"SCRN1",&H5400,J+1,0
90 PRINT"OKAY, NOW RUN SCRN2":EN
D
100 '#1
110 DATA70,3D,F0,10,39,F0,10,3D,
0,71,36,21,32,31,37,51,36,51,30,
31,32,21,36,71,0,70,6,F0,10,6,F0
,10,6,0,70,6,60,3D,70,6,70,3D,60
,6,0,C1,32,21,36,11,32,71,32,11,
36,21,32,C1,0,F0,20,6,F0,6,0
120 DATA10,28,E0,6,F0,6,E0,28,0,
41,36,31,32,B1,70,B1,32,31,36,41
,0,40,6,F0,F0,B0,6,0,40,6,F0,3D,
F0,80,6,0,B1,50,41,36,31,32,31,3
6,41,50,B1,0
130 DATAF0,50,6,90,6,0,B0,3D,60,
6,90,6,60,3D,0,51,36,51,32,91,50
```

VIP Database 1.1

"ONE OF THE BEST" JUL '84 "RAINBOW"

VIP DATABASE

VIP Database has all the features of VIP Database III described elsewhere in this magazine except the screen widths are 51, 64 & 85. Screen colors are black, green and white, double clock speed and Spooler are not supported. Even so, VIP Database is the most complete database for the CoCo 1 & 2! Version 1.1 has FASTER and more RELIABLE disk access and single spaced reports. DISK $49.95

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VIP Writer 1.1

RATED "BEST" IN SEPT '88 "RAINBOW"

VIP WRITER

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```
,91,32,51,36,51,0,50,6,F0,F0,90,
6,0,10,28,20,6,90,3D,F0,3D,90,6,
20,28,0,F1,32,81,32,81,32,F1,FF
140 '#2
150 DATA50,3D,A0,28,3D,F0,50,39,
50,28,0,21,36,31,32,41,37,41,36,
31,32,41,30,21,36,31,32,41,0,20,
6,F0,20,6,F0,6,0,20,6,F0,20,6,F0
,6,0,61,32,11,36,21,70,6,3D,A0,4
1,36,31,32,21,0
160 DATAA0,6,50,11,32,11,36,31,3
2,31,70,6,0,3D,70,6,A0,6,C0,28,2
0,6,3D,0,11,36,21,32,61,80,6,C0,
71,32,36,21,0,10,6,F0,40,6,F0,70
,6,0,10,6,90,28,30,21,36,61,32,3
1,D0,6,3D,0,41,32,36,51,50,6,F0,
31,32,51,36,11,0
170 DATA70,6,80,28,6,3D,F0,80,6,
0,40,3D,6,80,61,36,21,32,31,E0,6
,0,21,36,61,32,11,90,6,B0,31,96,
91,0,20,6,F0,40,6,E0,6,0,20,6,3D
,50,28,60,3E,6,E0,6,3D,0,81,32,4
1,30,21,32,71,32,21,30,91,32,31,
FF
180 '#3
190 DATA20,28,A0,3D,F0,E0,3D,20,
28,0,51,32,51,36,51,80,41,32,41,
36,51,32,51,0,B0,20,6,F0,90,6,0,
A0,3D,6,F0,3D,60,6,0,21,36,31,32
,91,32,31,37,31,32,B1,32,71,0
200 DATA20,6,B0,33,F0,20,3,0,20,
6,F0,F0,F0,3D,0,61,32,31,B0,31,3
2,31,B0,21,32,21,36,31,0,F0,F0,F
0,50,6,0,28,F0,90,39,F0,60,6,10,
28,0,21,36,11,32,31,B0,91,B0,21,
32,31,36,21,0
210 DATA20,6,F0,F0,F0,10,6,0,20,
6,3D,F0,F0,A0,3D,6,0,11,36,31,32
,21,B0,36,32,31,B0,31,32,31,36,1
1,0,10,6,F0,40,6,F0,B0,6,0,10,6,
F0,40,6,40,28,F0,20,3D,6,0,51,32
,21,D0,91,B0,51,32,51,0,B0,50,33
,F0,20,3,FF
220 '#4
230 DATA28,F0,90,39,F0,90,28,0,4
1,36,21,32,21,34,80,51,80,4,21,3
2,21,36,41,0,40,6,F0,F0,B0,6,0,4
0,6,70,3D,F0,60,3D,70,6,0,91,32,
21,36,31,34,C0,31,36,21,32,91,0
240 DATAE0,6,F0,60,6,0,20,28,A0,
6,F0,60,6,A0,28,0,61,32,B1,37,31
,36,31,30,B1,32,61,0,F0,B0,6,0,F
0,B0,6,3D,0,31,36,61,50,31,32,91
,32,31,50,61,36,31,0
250 DATA30,6,F0,F0,D0,6,0,28,10,
6,60,3D,F0,A0,3D,60,6,10,28,0,51
,36,31,32,31,34,F0,4,31,32,31,36
,51,0,50,6,F0,F0,90,6,0,50,6,70,
3D,F0,40,3D,70,6,0,C1,32,41,E0,4
,41,32,C1,FF
260 '#5
270 DATA70,3D,F0,F0,50,3D,0,21,3
2,21,36,21,32,21,30,11,32,21,36,
21,32,11,30,21,32,21,36,21,32,21
,0,70,6,F0,10,6,F0,10,6,0,70,6,3
D,70,28,40,6,40,28,70,3D,6,0,21,
32,71,36,21,32,21,40,6,40,21,32,
21,36,71,32,21,0
280 DATAC0,6,B0,6,B0,6,0,28,A0,6
,3D,80,6,B0,6,A0,28,0,51,32,B1,3
2,41,35,41,32,B1,32,51,0,0,20,28
,A0,3D,F0,60,3D,A0,28,0,20,51,32
,51,36,31,D0,31,36,51,32,51,0
290 DATAF0,6,F0,40,6,0,30,3E,90,
6,F0,40,6,90,39,0,31,36,31,37,61
,36,11,32,11,35,11,32,11,36,61,3
0,31,36,31,0,30,6,C0,6,D0,6,C0,6
,0,30,6,90,3D,6,D0,6,3D,90,6,0,A
1,32,B1,70,B1,32,A1,FF
300 '#6
310 DATAF0,70,3D,50,3D,0,3C,A0,3
1,32,31,36,11,37,11,36,31,32,31,
A0,C,0,41,F0,30,6,50,6,F0,30,41,
0,A0,28,A0,6,50,6,A0,28,0,36,32,
61,A0,6,10,39,10,6,A0,61,32,36,0
320 DATA6,F0,30,51,36,51,F0,30,6
,0,6,3D,F0,50,6,F0,50,3D,6,0,21,
36,11,32,21,F0,6,F0,21,32,11,36,
21,0,20,6,F0,60,6,F0,60,6,0,20,6
,E0,28,50,6,50,28,E0,6,0,11,36,2
1,32,21,30,71,50,6,50,71,30,21,3
2,21,36,11,0
330 DATA10,6,F0,70,6,F0,70,6,0,1
0,6,3D,A0,28,70,6,70,28,A0,3D,6,
0,21,36,31,32,31,32,21,70,6,70,2
1,32,31,32,31,36,21,0,20,6,F0,60
,6,F0,60,6,0,20,6,3D,F0,30,6,F0,
30,3D,6,0,B1,32,51,60,51,60,51,3
2,B1,FF
340 '#7
350 DATA28,F0,3D,F0,3D,F0,28,0,3
1,36,51,32,61,36,31,37,31,36,61,
32,51,36,31,0,30,6,E0,6,90,6,E0,
6,0,30,6,E0,6,3D,30,3B,6,E0,6,0,
A1,36,21,32,81,32,81,32,21,36,A1
,0
360 DATAA0,6,F0,E0,6,0,A0,6,D0,3
D,D0,6,0,41,32,B1,32,51,36,51,32
,B1,32,41,0,F0,B0,6,0,28,60,3D,F
0,6,20,39,A0,3D,60,28,0,51,36,11
,32,11,36,21,30,D1,30,21,36,11,3
2,11,36,51,0,50,6,50,6,F0,80,6,5
0,6,0
370 DATA50,6,50,6,3D,F0,20,3D,6,
50,6,0,41,36,31,32,71,36,31,30,3
1,36,71,32,31,36,41,0,40,6,D0,6,
90,6,D0,6,0,28,20,6,3D,A0,6,90,6
,A0,3D,6,20,28,0,C1,32,A1,50,A1,
32,C1,FF
380 '#8
390 DATA10,28,80,3D,F0,C0,3D,80,
28,0,41,32,41,36,30,36,32,36,37,
36,32,36,30,36,41,32,41,0,B0,6,3
0,6,30,6,30,6,30,6,30,6,0,B0,6,3
```

```
D,6,30,6,30,6,30,6,3D,6,0,20,31,
32,C1,32,31,36,31,32,C1,32,31,0,
F0,B0,6,0,F0,80,3D,6,3D,0
400 DATA80,31,36,31,36,32,36,31,
36,32,36,31,36,31,0,B0,6,30,6,30
,6,30,6,30,6,30,6,0,28,3D,60,6,3
0,6,30,6,3E,6,30,6,30,6,60,3D,28
,0,41,32,71,30,6,30,31,32,31,30,
6,30,71,32,41,0,F0,20,6,F0,6,0,F
0,20,6,F0,6,0
410 DATA60,31,36,11,32,11,81,50,
81,11,32,11,36,31,0,90,6,F0,F0,1
0,6,0,28,40,3D,6,E0,39,E0,6,3D,4
0,28,0,31,32,81,32,21,70,4,70,21
,32,81,32,31,FF
420 '#9
430 DATA40,39,F0,3D,0,41,36,71,5
0,31,36,21,31,E1,32,91,0,40,6,F0
,6,70,33,0,40,6,60,28,3D,40,6,0,
91,37,41,36,91,0,F0,10,6,F0,50,3
1,36,41,32,41,0,28,40,3E,70,6,F0
,80,6,0
440 DATA31,36,21,32,21,30,6,F0,8
0,6,3D,0,30,6,A0,6,F0,50,B1,36,3
1,0,30,6,3D,70,6,F0,F0,10,6,0,71
,32,11,36,81,32,31,F0,70,6,0,B0,
6,F0,A0,41,32,A1,0
450 DATA28,90,6,B0,28,0,31,36,30
,A1,32,61,0,30,6,F0,F0,30,21,32,
21,30,21,32,21,0,30,6,70,3D,0,91
,32,41,30,31,32,31,0,F0,F0,20,33
,FF
460 '#10
470 DATAF0,B0,39,0,11,32,11,F0,2
0,41,36,41,F0,20,11,32,11,0,A0,1
1,32,11,B0,6,B0,11,32,11,0,28,3D
,F0,3D,30,6,F0,60,3D,28,0,21,36,
31,32,31,30,31,32,91,32,31,37,31
,32,31,36,21,0,20,6,F0,F0,F0,6,0
480 DATA20,6,F0,F0,F0,6,0,31,36,
11,80,32,80,32,80,32,80,11,36,31
,0,30,6,F0,F0,D0,6,0,28,10,6,3D,
F0,F0,70,3D,6,10,28,0,D1,32,A1,3
6,A1,32,D1,0
490 DATAF0,B0,6,0,28,F0,90,6,3D,
F0,60,28,0,21,36,21,40,61,32,F1,
32,61,40,21,36,21,0,20,6,F0,F0,F
0,6,0,20,6,F0,F0,F0,6,0,71,80,32
,70,11,32,11,70,32,80,71,FF
500 '#11
510 DATA20,28,F0,3D,F0,D0,39,0,9
1,32,81,35,31,32,41,50,41,32,41,
36,41,0,F0,50,33,F0,B0,6,0,28,F0
,F0,3D,E0,6,20,28,0,41,32,41,36,
21,B0,41,32,31,32,41,36,91,0
520 DATAB0,6,F0,F0,6,0,40,3D,40,
6,F0,F0,6,0,41,32,91,B0,31,32,31
,70,71,32,31,0,0,F0,F0,90,3D,0,2
1,36,41,32,41,B0,51,32,61,32,51,
36,41,0,20,6,F0,F0,E0,6,0,20,6,6
```

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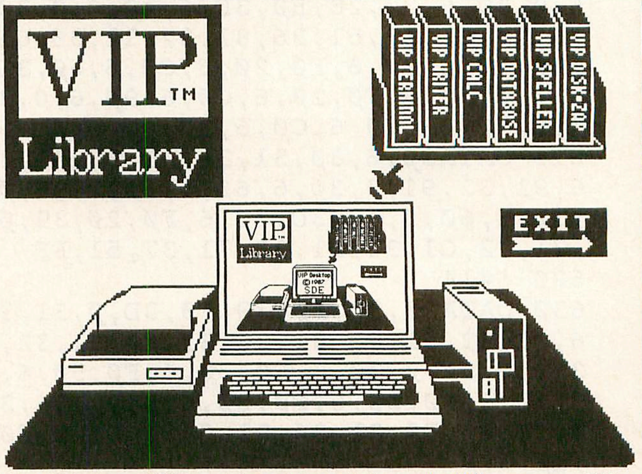

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```
0,3D,28,F0,C0,3D,30,6,20,28,0
530 DATA91,32,41,B0,31,32,31,37,
31,32,B1,0,0,28,F0,F0,D0,3D,60,2
8,0,71,32,61,B0,51,32,51,35,51,3
2,51,0,F0,50,33,FF
540 '#12
550 DATA28,3D,F0,60,39,F0,60,3D,
28,0,21,32,36,32,21,B0,21,36,21,
B0,21,32,36,32,21,0,50,6,F0,30,6
,F0,30,6,0,50,6,3D,F0,6,F0,3D,6,
0,A1,32,21,36,41,30,51,37,41,36,
21,32,A1,0
560 DATAF0,6,F0,40,6,0,F0,6,E0,3
D,20,6,0,71,32,B1,32,21,35,21,32
,B1,32,71,0,0,28,F0,3D,F0,3B,F0,
28,0,41,32,41,36,41,32,51,35,51,
32,41,36,41,32,41,0,B0,6,F0,C0,6
,0
570 DATAB0,6,3D,F0,60,3D,6,0,41,
32,81,36,31,30,21,32,21,30,31,36
,81,32,41,0,F0,6,F0,40,6,0,28,D0
,6,3D,D0,3D,6,D0,28,0,61,32,C1,3
2,21,30,21,32,C1,32,61,FF
580 '#13
590 DATA28,3D,0,81,32,81,36,40,3
D,C0,3D,90,28,0,F0,40,36,41,32,4
1,36,51,32,51,36,31,0,F0,40,6,B0
,6,D0,6,0,28,3D,E0,6,B0,6,D0,6,0
,31,36,51,32,B1,10,28,3D,20,6,D0
,6,10,28,0
600 DATA30,6,F0,40,31,36,61,30,1
1,36,11,32,71,0,30,6,F0,70,6,A0,
6,0,30,6,30,28,E0,3D,6,A0,6,0,30
,6,30,61,32,51,36,81,32,11,36,61
,30,3E,0,30,6,F0,20,6,C0,6,60,31
,36,0,30,6,F0,20,6,C0,6,90,6,0,3
0,6,30,28,C0,6,C0,6,3D,60,6,0
610 DATA30,6,30,31,36,31,32,B1,3
6,91,32,91,0,30,6,60,6,F0,20,6,0
,30,6,60,6,70,3D,70,6,F0,20,39,0
,71,32,C1,32,D1,32,71,37,51,FF
620 '#14
630 DATA80,3D,F0,39,F0,3D,0,31,3
6,31,32,31,80,31,36,31,80,31,32,
31,36,31,0,30,6,F0,50,6,F0,50,6,
0,30,6,F0,50,6,F0,50,6,0,91,36,3
1,34,F0,70,31,36,91,0,90,6,F0,F0
,10,6,0
640 DATA10,28,60,6,70,3D,B0,3D,7
0,6,60,28,0,F1,32,81,36,81,32,F1
,0,F0,B0,6,0,80,3D,F0,6,F0,3D,0,
31,32,31,36,31,F0,70,4,31,36,31,
32,31,0,90,6,F0,F0,10,6,0
650 DATA30,28,40,6,E0,3D,E0,6,40
,28,0,20,31,36,51,32,11,30,61,32
,61,37,11,32,51,36,31,0,50,6,F0,
F0,90,6,0,10,28,20,6,3D,F0,F0,30
,3D,6,20,28,0,81,32,21,34,F0,B0,
21,32,81,FF
660 '#15
670 DATAB0,3D,90,28,40,39,F0,3D,
0,41,36,41,32,41,32,41,30,51,36,
21,37,31,32,31,36,31,0,40,6,F0,B
0,6,E0,6,0,40,6,F0,B0,6,B0,3D,6,
0,A1,36,11,32,11,D0,71,36,31,32,
91,0,A0,6,F0,A0,6,0,28,80,6,40,3
C,F0,30,6,D0,28,0
680 DATA31,32,D1,32,51,36,50,91,
36,31,32,31,0,D0,33,B0,6,E0,6,0,
F0,50,28,50,6,E0,6,3D,0,F0,50,A1
,70,21,32,81,36,31,0,31,32,31,F0
,F0,B0,6,0,F0,F0,B0,3D,60,6,0,F0
,50,11,32,11,36,90,51,32,61,36,2
1,0
690 DATA31,32,31,F0,10,6,F0,80,6
,0,F0,50,28,30,6,F0,80,6,0,F0,50
,81,32,71,50,31,32,71,0,D0,33,FF
700 '#16
710 DATA10,28,70,3D,F0,90,3D,E0,
28,0,51,32,51,F0,90,61,36,31,32,
41,0,D0,61,32,61,F0,6,0,F0,D0,51
,32,51,20,6,50,3D,28,0,10,28,F0,
F0,80,41,36,21,32,31,0,51,32,51,
C0,3D,F0,20,6,0
720 DATA50,3D,28,30,61,32,61,F0,
20,6,0,41,36,41,F0,20,51,32,51,1
0,3D,6,0,40,6,F0,F0,40,71,36,32,
21,0,40,6,F0,40,31,32,21,36,21,9
0,6,0,B1,3D,F0,50,6,B0,6,0,B0,61
,32,61,80,6,40,37,C1,0,20,39,F0,
60,31,32,71,3D,0
730 DATA21,36,21,F0,F0,31,32,31,
36,21,32,21,0,20,6,F0,F0,B0,6,0,
20,6,B0,3D,D0,3D,B0,6,0,D1,32,81
,32,81,32,F1,31,FF
740 '#17
750 DATA28,C0,3D,F0,60,3D,C0,28,
0,31,36,41,32,41,90,34,90,41,32,
41,36,31,0,30,6,F0,F0,D0,6,0,30,
6,F0,50,39,F0,50,6,0,91,34,A0,41
,36,41,A0,4,91,0,F0,B0,6,0,28,B0
,3D,A0,6,A0,3D,B0,28,0
760 DATA21,32,21,36,11,32,21,34,
70,4,70,4,21,32,11,36,21,32,21,0
,70,6,F0,F0,50,6,0,30,28,20,6,3D
,D0,3E,D0,3D,6,20,28,0,37,51,36,
31,32,91,32,91,32,31,36,51,0,80,
6,60,33,F0,3,60,6,0,80,6,F0,F0,3
0,6,0
770 DATA21,36,32,51,B0,21,32,21,
B0,51,32,36,21,0,20,6,F0,F0,F0,6
,0,20,6,3D,F0,F0,90,3D,6,0,81,32
,21,B0,21,32,21,B0,21,32,81,0,F0
,20,33,F0,3,FF
780 '#18
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,31,36,41,32,41,80,A1,36,21,30,5
1,32,51,0,30,6,F0,E0,6,0,30,6,10
,28,F0,80,39,6,D0,3D,28,0,91,80,
71,36,21,30,91,37,41,32,51,0,F0,
90,6,0
800 DATA90,28,D0,6,F0,3D,90,28,0
,90,81,36,C1,30,31,32,31,36,31,3
2,31,0,F0,20,6,60,33,F0,6,0,20,2
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8,D0,6,F0,3D,60,6,0,20,61,32,21,
36,61,B0,41,32,A1,32,31,0,D0,6,0
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,36,31,30,61,32,11,B0,31,36,71,3
2,71,0,30,6,F0,F0,6,0,30,6,F0,3D
,90,3D,6,0,30,61,32,41,32,31,B0,
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,3D,30,3E,70,6,70,6,0,30,6,40,31
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840 DATA30,6,3D,40,6,60,6,50,6,6
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,31,36,21,32,21,36,31,0,30,6,70,
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850 DATA30,6,40,31,36,A1,36,A1,3
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,39,B0,6,0,28,60,6,3D,80,B1,80,3
D,6,60,28,0,31,32,71,32,31,F0,20
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,E0,6,0,20,6,3D,F0,B0,28,D0,6,0,
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,37,71,32,11,0
880 DATAF0,F0,70,6,0,F0,3D,F0,40
,6,0,32,34,60,11,36,41,32,41,70,
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890 DATA11,32,11,60,6,0,B0,6,0,2
8,60,3D,6,0,41,32,91,90,4,31,32,
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900 '#21
910 DATA10,28,90,3D,F0,3D,F0,28,
0,61,32,61,30,31,36,71,32,71,32,
71,0,F0,60,6,B0,3,0,90,3D,90,6,3
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,33,F0,E0,6,0
920 DATA30,6,20,39,F0,F0,20,28,5
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,F0,3D,0,10,6,F0,80,6,C0,51,32,5
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930 DATA81,36,31,B0,28,6,0,80,6,
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,33,E0,3,FF
940 '#22
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,28,10,6,60,6,B0,3D,B0,6,60,6,10
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960 DATA60,6,60,6,80,3D,80,6,60,
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0,6,60,6,D0,6,60,6,0,60,3D,6,60,
6,50,3D,50,6,60,6,3D,0,31,32,61,
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,61,32,31,0
970 DATAC0,6,60,6,70,6,60,6,0,28
,A0,6,60,6,20,3E,20,6,60,6,A0,28
,0,F1,36,30,51,36,51,30,36,F1,0,
F0,6,80,6,80,6,0,60,3D,60,6,40,2
8,20,6,20,28,40,6,60,3D,0,61,32,
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980 '#23
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,11,34,A0,11,36,11,37,F0,20,3D,6
,50,28,0,10,6,F0,6,A0,21,36,31,3
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1010 DATA80,6,F0,60,6,F0,20,6,0,
50,3D,6,70,39,B0,6,3D,B0,3D,6,0,
41,32,81,30,21,32,21,70,61,32,11
,30,21,32,61,FF
1020 '#24
1030 DATA28,A0,3D,B0,39,B0,3D,A0
,28,0,31,32,41,32,31,37,21,32,21
,36,21,32,21,30,31,32,41,32,31,0
,F0,B0,6,0,60,3D,B0,28,40,6,40,2
8,B0,3D,0,61,32,61,36,41,40,6,40
,41,36,61,32,61,0,F0,6,80,6,80,6
,0
1040 DATAF0,6,80,6,80,6,0,21,36,
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6,21,0,20,6,F0,F0,F0,6,0,20,6,F0
,60,3E,F0,60,6,0,71,32,21,30,21,
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F0,20,6,F0,6,0,28,3D,C0,6,F0,6,C
0,3D,28,0
1050 DATA51,36,31,32,91,90,91,32
,31,36,51,0,50,6,F0,F0,90,6,0,20
,3D,6,F0,30,3D,F0,30,6,3D,0,A1,3
2,31,30,71,32,71,30,31,32,A1,FF
1060 '#25
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,28,0,21,36,91,32,91,32,91,32,91
,36,21,0,20,6,F0,F0,F0,6,0,20,6,
3D,F0,30,3B,F0,30,3D,6,0,41,36,3
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1,32,31,36,71,32,71,36,31,32,31,
36,41,0,40,6,90,6,F0,20,6,90,6,0
1080 DATA28,20,6,90,6,3D,E0,6,90
,6,20,28,0,21,36,32,11,70,51,32,
21,36,21,32,51,70,11,32,36,21,0,
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21,32,71,32,21,36,50,37,21,36,31
,0,30,6,A0,6,F0,20,6,A0,6,0
1090 DATA28,10,6,A0,6,E0,3D,6,A0
,6,10,28,0,21,36,11,32,21,50,51,
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6,F0,60,6,39,F0,30,6,0,71,C0,34,
B1,4,C0,71,FF
1100 '#26
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,30,51,32,41,36,31,0,30,6,F0,F0,
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1120 DATA11,36,11,50,32,50,32,50
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1140 '27
1150 DATA10,28,F0,3D,D0,3D,F0,28
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1160 DATAB0,3D,70,28,90,28,70,3D
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,41,36,31,32,41,0,A0,6,F0,E0,6,0
,B0,3D,F0,C0,3D,0,41,36,41,32,41
,32,41,50,41,32,41,32,41,36,41,0
,40,6,F0,F0,B0,6,0,F0,B0,3D,0,41
,32,41,50,31,36,41,32,41,36,31,5
0,41,32,41,0
1170 DATAF0,40,6,B0,6,0,28,90,3D
,F0,C0,3D,90,28,0,61,32,71,32,31
,35,50,61,32,71,32,61,FF
1180 DATA0F
```

130	247	640	4
180	16	690	83
250	168	770	182
310	108	820	212
380	146	900	149
440	39	960	83
520	253	END	5
570	7		

Listing 4: SCRN2

```
10 PCLEAR1:CLEAR50,&H65FF:J=&H66
B4
20 PRINT"WORKING..."
30 READA$:POKEJ,VAL("&H"+A$):J=J
+1:IFA$<>"0F"THEN30
40 PRINTHEX$(J)
50 INPUT"SAVE TO (T)APE OR (D)IS
K";A$:A$=LEFT$(A$,1):IFA$="D"ORA
$="d"THEN80ELSEIFA$<>"T"ANDA$<>"
t"THEN50
60 INPUT"PRESS ENTER WHEN TAPE I
S READY";A$
70 CSAVEM"SCRN2",&H66B4,J+1,0:GO
TO90
80 SAVEM"SCRN2",&H66B4,J+1,0
90 PRINT"OKAY, NOW RUN MAKEPROS"
:END
100 '#28
110 DATAF0,50,3D,F0,F0,10,28,0,3
6,11,32,11,36,37,36,31,32,31,36,
30,36,11,32,11,36,30,36,21,32,21
,0,6,50,6,30,6,90,6,30,6,50,6,30
,6,0,6,50,6,30,6,3D,60,6,30,6,50
,6,30,6,3D,0,36,11,32,41,30,36,3
1,36,61,30,6,50,6,30,71,36,0
120 DATA6,B0,6,30,31,36,60,41,32
,41,A0,6,0,6,3D,80,6,60,31,36,3D
,E0,28,50,6,0,36,11,32,11,36,30,
36,31,32,51,36,21,32,31,70,41,36
,31,0,6,50,6,30,6,B0,6,F0,40,6,0
,6,50,6,30,6,3E,80,6,F0,40,6,0
130 DATA36,11,32,41,30,36,11,32,
11,60,6,F0,10,3D,6,0,6,B0,6,B0,3
6,11,32,11,36,30,36,81,36,0,6,30
,39,50,6,3D,50,28,10,6,50,6,30,6
,80,6,0,31,36,31,50,71,32,41,36,
50,6,30,6,50,3D,6,0,30,6,F0,70,6
,50,6,30,36,31,36,51,0
140 DATA30,6,80,3D,50,28,40,6,50
,6,30,6,30,21,36,0,D1,32,81,40,4
1,32,41,30,31,50,31,32,FF
150 '#29
160 DATAB0,3D,F0,D0,3D,0,31,36,3
1,32,31,F0,B0,31,32,31,36,31,0,3
0,6,F0,F0,E0,6,0,30,6,50,3C,90,2
8,60,28,90,C,50,6,0,81,32,21,36,
91,60,91,36,21,32,81,0,D0,6,F0,9
0,6,0,28,3D,80,6,F0,90,6,80,3D,2
8,0
170 DATA51,32,A1,36,11,C0,11,36,
A1,32,51,0,F0,30,6,E0,6,0,B0,3D,
40,6,E0,6,40,3D,0,31,36,11,35,21
,32,71,C0,71,32,21,35,11,36,31,0
,30,6,F0,F0,E0,6,0,39,6,D0,3D,C0
,3D,D0,6,0
180 DATA91,30,11,32,11,36,21,C0,
21,36,11,32,11,37,91,0,F0,20,6,F
```

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0,10,6,0,F0,20,6,F0,10,6,0,11,32
,11,34,70,A1,60,A1,70,4,11,32,11
,FF
190 '#30
200 DATA28,C0,3D,F0,D0,C,0,21,32
,21,36,21,32,21,A0,F1,E1,0,70,6,
F0,A0,3,0,70,6,F0,F0,3D,0,11,32,
11,36,51,70,51,36,31,B0,31,32,31
,36,21,0,50,6,F0,20,6,F0,80,6,0,
50,6,E0,3D,6,10,28,F0,20,28,10,6
,0,50,6,3D,A0,A1,B0,21,36,91,0
210 DATA31,36,21,32,11,F0,F0,20,
6,0,30,6,F0,F0,80,6,3D,0,30,6,D0
,21,32,21,36,21,B0,61,32,11,36,1
1,0,30,6,3D,F0,20,6,F0,80,6,0,11
,36,31,32,21,E0,6,F0,50,3D,6,0,1
0,6,F0,C1,B0,21,36,11,32,51,0
220 DATA10,6,F0,F0,A0,6,0,10,6,7
0,28,F0,F0,10,6,20,39,0,71,32,31
,70,41,32,41,B0,B1,37,0,F0,F0,50
,3,FF
230 '#31
240 DATA28,3D,F0,60,3D,F0,60,3D,
28,0,41,36,21,32,11,30,41,32,31,
36,31,32,41,37,11,32,21,36,41,0,
40,6,F0,40,6,F0,40,6,0,10,3D,6,F
0,40,6,39,F0,10,6,3D,0,11,32,11,
36,51,36,21,50,91,50,21,36,51,36
,11,32,11,0,50,6,50,6,F0,80,6,50
,6,0
250 DATA20,28,10,6,50,6,70,3E,D0
,6,50,6,10,28,0,20,71,30,81,32,3
1,35,31,32,81,30,71,0,0,B0,C,40,
28,60,3D,60,28,40,3C,0,11,36,71,
32,11,30,31,32,21,35,21,32,31,30
,11,32,71,36,11,0,10,6,F0,F0,F0,
20,6,0,10,6,90,3D,28,F0,40,28,3D
,90,6,0
260 DATA41,30,31,32,36,31,34,E0,
31,36,32,31,30,41,0,D0,6,F0,80,6
,0,40,28,70,6,3D,F0,20,3D,6,70,2
8,0,30,61,32,71,E0,4,71,32,61,FF
270 '#32
280 DATA28,F0,3D,F0,3D,F0,28,0,3
1,36,41,32,51,36,51,32,51,36,51,
32,41,36,31,0,30,6,C0,6,D0,6,C0,
6,0,30,6,3D,90,6,50,3E,50,6,90,3
D,6,0,81,36,21,32,A1,32,A1,32,21
,36,81,0,80,6,F0,F0,30,6,0,28,60
,6,3D,F0,C0,3D,6,60,28,0
290 DATA31,32,61,32,21,36,37,C0,
36,21,32,61,32,31,0,90,3,50,6,F0
,6,50,33,0,F0,20,6,60,39,60,6,0,
11,32,11,B0,41,60,34,60,41,B0,11
,32,11,0,0,28,F0,90,3D,F0,90,28,
0,51,B0,41,32,31,36,31,32,41,B0,
51,0
300 DATAF0,B0,6,0,F0,80,3D,6,0,1
1,32,11,B0,31,32,B1,32,31,B0,11,
32,11,0,90,3,F0,F0,10,33,FF
310 '#33
320 DATA28,3D,F0,F0,C0,3E,0,31,3
6,11,32,31,36,F0,80,37,35,32,31,
36,21,0,30,6,70,51,32,81,36,F0,4
0,6,0,30,6,40,39,90,33,40,41,32,
31,36,3D,60,6,0,61,36,41,F0,80,9
1,32,81,0,60,6,0,60,6,F0,F0,80,3
D,0
330 DATA11,32,71,36,41,B0,51,32,
61,32,51,36,21,0,B0,6,F0,F0,70,6
,0,28,90,6,F0,F0,70,6,0,41,32,B1
,F0,30,28,80,C,20,6,0,F0,E0,31,3
2,31,50,41,36,61,0,28,F0,F0,F0,6
,0,41,32,51,36,31,F0,E0,6,0,C0,6
,E0,31,32,31,90,6,3D,10,28,0
340 DATAC0,6,F0,F0,10,41,32,31,0
,61,32,61,35,0,F0,70,33,FF
350 '#34
360 DATA3E,F0,3D,D0,3D,F0,39,0,1
1,36,11,37,81,32,71,36,71,32,81,
30,11,36,11,0,10,6,F0,70,6,F0,70
,6,0,10,6,3D,F0,40,6,F0,40,3D,6,
0,51,32,21,36,51,30,D1,30,51,36,
21,32,51,0
370 DATAA0,6,F0,E0,6,0,A0,6,F0,E
0,6,0,21,35,11,32,61,36,31,34,A0
,31,36,61,32,11,35,21,0,F0,6,F0,
40,6,0,28,D0,6,3D,D0,3D,6,D0,28,
0,51,36,21,32,D1,30,D1,32,21,36,
51,0,50,6,F0,F0,90,6,0
380 DATA50,6,3D,20,28,90,C,10,3C
,90,28,20,3D,6,0,31,36,31,32,31,
60,51,32,51,60,31,32,31,36,31,0,
30,6,F0,F0,D0,6,0,30,6,3D,F0,F0,
70,3D,6,0,91,32,31,60,21,32,31,3
2,21,60,31,32,91,FF
390 '#35
400 DATA10,39,10,28,F0,F0,B0,28,
10,3E,0,11,36,31,37,F0,F0,80,31,
36,11,0,10,6,30,41,32,41,80,3D,8
0,41,32,41,30,6,0,10,6,E0,81,32,
81,E0,6,0,21,36,32,11,F0,F0,70,1
1,32,36,21,0,20,6,F0,60,3D,F0,60
,6,0,20,6,E0,71,32,71,E0,6,0
410 DATA28,6,50,31,32,31,F0,20,3
1,32,31,50,6,28,0,31,36,32,11,F0
,10,3D,F0,10,11,32,36,31,0,30,6,
D0,21,32,21,36,21,32,21,D0,6,0,2
8,10,6,F0,50,6,F0,50,6,10,28,0
420 DATAA1,36,3D,A0,6,A0,3D,36,A
1,0,A0,41,32,11,36,21,30,6,30,21
,36,11,32,41,0,10,28,F0,81,36,81
,F0,28,0,41,32,31,F0,10,6,F0,10,
31,32,41,0,A0,31,32,31,70,6,3D,4
0,31,32,31,0,F0,40,21,32,71,32,2
1,FF
430 '#36
440 DATA0,10,28,3D,F0,F0,A0,C,40
,28,0,41,36,11,32,21,70,81,32,51
,36,F1,21,0,40,6,F0,E0,6,0,40,6,
40,28,F0,80,6,3D,B0,28,0,81,32,2
1,37,F0,30,C1,32,71,0,F0,50,21,3
6,21,32,21,0
450 DATAF0,70,6,0,F0,70,6,3D,0,2
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1,36,31,32,31,80,61,32,51,32,51,
32,41,36,21,0,20,6,F0,F0,F0,10,6
,0,20,6,3D,F0,F0,D0,6,0,81,36,21
,90,3C,F0,B0,6,0,80,6,90,21,36,9
1,70,41,36,81,0
460 DATA28,60,6,B0,6,F0,50,6,0,2
1,32,91,80,6,30,39,10,28,B0,6,3D
,0,F0,50,81,32,31,80,81,32,31,FF
470 '#37
480 DATA10,28,F0,3D,D0,3D,F0,28,
0,61,32,91,32,51,35,51,32,91,32,
61,0,0,F0,B0,3D,0,21,36,11,32,11
,30,31,36,31,32,51,32,31,36,31,3
7,11,32,11,36,21,0,20,6,B0,6,F0,
20,6,B0,6,0,20,6,B0,6,70,3D,70,6
,B0,6,0
490 DATA31,36,11,A0,4,36,31,32,3
1,36,34,A0,11,36,31,0,30,6,E0,6,
90,6,E0,6,0,30,6,30,28,90,6,30,3
9,30,6,90,28,30,6,0,11,36,21,32,
21,A0,4,21,36,21,34,A0,21,32,21,
36,11,0,10,6,F0,70,6,F0,70,6,0
500 DATA10,6,F0,70,6,3D,F0,40,6,
0,51,40,31,36,41,32,B1,32,41,36,
31,40,51,0,C0,6,F0,A0,6,0,28,A0,
6,3D,F0,40,3D,6,A0,28,0,41,32,91
,32,71,35,71,32,91,32,41,FF
510 '#38
520 DATA30,39,80,28,F0,3D,F0,40,
28,0,31,36,51,30,31,36,51,32,51,
36,51,32,51,36,31,0,30,6,B0,6,D0
,6,D0,6,0,30,6,B0,6,3D,A0,6,D0,6
,0,61,36,41,32,31,36,31,32,31,36
,51,30,11,32,11,36,51,0
530 DATA60,6,A0,6,90,6,D0,6,0,60
,6,3D,70,6,90,6,3D,A0,6,30,28,0,
11,32,81,36,A1,37,71,32,F1,21,0,
C0,6,0,28,70,3D,6,F0,80,3C,0,31,
32,31,36,11,32,21,34,F0,31,32,21
,0
540 DATA90,6,0,90,6,3D,0,31,32,7
1,36,21,A0,4,21,32,21,36,21,50,2
1,32,21,0,D0,6,F0,70,6,0,28,3B,8
0,6,F0,70,6,0,41,32,D1,34,C0,81,
50,21,32,21,FF
550 '#39
560 DATA80,3E,F0,3D,F0,39,0,21,3
2,31,36,11,30,11,36,71,32,71,36,
11,37,11,36,31,32,21,0,80,6,50,6
,F0,20,6,50,6,0,80,6,20,3D,6,F0,
20,6,3D,20,6,0,20,36,31,36,11,32
,11,36,31,36,50,36,31,36,11,32,1
1,36,31,36,0
570 DATA21,36,32,41,30,71,36,11,
32,11,36,71,30,41,32,36,21,0,20,
6,F0,20,6,50,6,F0,20,6,0,20,6,A0
,28,50,6,10,3D,10,6,50,28,A0,6,0
,21,36,32,36,11,30,71,36,11,32,1
1,36,71,30,11,36,32,36,21,0,20,6
1,36,11,32,A1,50,A1,32,11,36,61,
0
580 DATA80,6,70,3,D0,33,70,6,0,5
0,3D,6,F0,F0,30,6,3D,0,21,36,32,
61,B0,11,32,11,B0,61,32,36,21,0,
20,6,F0,F0,F0,6,0,20,6,F0,F0,F0,
6,0,20,6,70,28,F0,C0,28,70,6,0,8
1,32,31,B0,11,32,11,B0,31,32,81,
0,F0,30,3,D0,33,FF
590 '#40
600 DATA28,F0,3D,F0,3D,F0,28,0,5
1,32,51,36,61,32,61,37,61,32,61,
36,31,0,D0,6,F0,F0,30,6,0,A0,3D,
6,F0,70,C,80,6,10,28,0,31,36,21,
32,91,70,91,36,61,32,71,0,30,6,F
0,F0,6,0,30,6,F0,F0,6,E0,28,0
610 DATA11,36,31,32,21,70,81,32,
91,32,61,36,41,0,10,6,F0,F0,E0,6
,0,10,6,39,40,28,80,3C,F0,3D,60,
6,0,71,40,81,36,D1,60,31,32,31,3
6,21,0,F0,40,6,F0,D0,6,0,E0,28,3
0,6,3D,60,28,F0,20,6,0
620 DATA21,32,21,70,21,36,41,32,
21,30,B1,40,91,0,F0,10,6,0,F0,10
,6,3D,F0,10,28,0,21,32,21,70,91,
32,61,32,51,60,31,32,31,FF
630 '#41
640 DATAF0,3D,80,39,80,3D,0,41,3
6,51,32,51,30,31,36,31,37,51,32,
51,36,41,0,40,6,F0,40,6,F0,40,6,
0,28,20,6,3D,F0,10,6,F0,10,3D,6,
20,28,0,61,36,21,32,21,50,D1,50,
21,32,21,36,61,0
650 DATA60,6,F0,F0,70,6,0,60,6,3
D,F0,F0,10,3D,6,0,11,32,41,36,31
,32,71,70,11,32,41,32,D1,0,80,6,
60,33,F0,3,0,28,30,3B,6,0,31,32,
71,B0,21,32,21,B0,41,36,11,32,21
,0
660 DATAF0,F0,F0,10,6,0,A0,3D,F0
,F0,3D,6,40,28,0,31,36,21,32,21,
B0,21,32,21,B0,81,36,21,0,30,6,F
0,F0,E0,6,0,30,6,50,28,F0,F0,40,
3D,6,0,81,32,21,B0,21,32,21,B0,2
1,32,81,0,F0,20,33,F0,3,FF
670 '#42
680 DATA28,3E,F0,60,39,F0,90,28,
0,11,32,36,37,B0,36,21,32,21,36,
E0,36,32,11,0,40,6,B0,36,31,70,3
1,36,B0,6,0,40,31,36,50,36,31,D0
,31,36,50,36,31,0,70,41,36,41,F0
,40,41,36,41,0,B0,6,F0,C0,6,0,70
,28,20,6,3D,F0,60,3D,6,20,28,0
690 DATA70,36,51,36,F0,40,36,51,
36,0,40,36,31,50,31,36,D0,36,31,
50,31,36,0,36,41,B0,31,36,3D,40,
36,31,B0,41,36,0,6,F0,30,51,36,5
1,F0,30,6,0,6,60,3D,28,C0,6,C0,2
8,3D,60,6,0
700 DATA36,41,32,41,60,28,40,6,3
D,10,28,60,41,32,41,36,0,6,F0,20
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,36,32,31,32,36,F0,20,6,0,6,90,3
6,11,32,41,90,41,32,11,36,90,6,0
,6,3D,20,36,41,F0,A0,41,36,20,3D
,6,0,41,32,41,F0,F0,30,41,32,41,
FF
710 '#43
720 DATA80,3D,F0,F0,50,3D,0,36,5
1,32,51,40,36,31,32,31,36,50,21,
32,51,32,21,0,6,F0,20,6,90,6,0,6
,F0,20,6,3D,60,6,50,28,B0,28,0,8
1,32,51,40,61,32,61,50,61,35,36,
31,0
730 DATAC0,33,F0,F0,40,6,0,F0,F0
,30,28,B0,3D,6,0,10,21,32,21,B0,
36,51,32,51,40,36,31,32,31,36,0,
F0,40,6,F0,20,6,90,6,0,30,39,D0,
6,50,3D,90,6,90,6,0,10,71,B0,81,
32,51,40,61,32,61,0
740 DATA0,F0,F0,60,3D,90,28,0,10
,21,32,21,B0,31,36,11,32,11,37,3
1,32,21,36,11,30,31,36,21,0,F0,7
0,6,F0,10,6,70,6,0,10,28,F0,40,6
,3D,D0,6,3D,40,6,0,10,71,B0,91,3
2,31,40,35,51,32,71,0,C0,33,FF
750 '#44
760 DATAF0,B0,28,F0,3D,0,3C,F0,5
0,37,61,32,61,32,61,36,31,0,A1,F
0,F0,A0,6,0,A0,91,F0,D0,3D,6,0,2
1,36,21,32,21,70,81,F0,10,11,36,
32,61,0,20,6,F0,70,A1,70,6,0
770 DATA28,6,3D,F0,F0,60,6,70,28
,0,71,36,41,32,51,F0,60,41,32,36
,31,0,70,6,F0,F0,A0,6,0,70,6,50,
3E,50,3D,F0,60,3D,6,0,31,36,81,3
2,B1,32,41,90,21,36,71,0,30,6,F0
,33,F0,70,6,0
780 DATA30,6,3D,F0,40,28,40,39,9
0,6,0,71,32,11,36,31,B0,31,36,31
,50,91,36,21,0,B0,6,F0,20,6,F0,2
0,6,0,28,90,6,F0,20,6,E0,3D,6,0,
41,32,A1,B0,91,70,21,32,71,0,F0,
60,33,FF
790 '#45
800 DATAB0,3D,F0,F0,60,3D,28,0,3
1,36,81,32,81,50,41,36,41,32,41,
32,41,0,30,6,F0,D0,6,0,30,6,3D,C
0,28,3D,0,A1,36,41,37,E1,32,41,3
2,51,36,31,0,A0,6,D0,3,F0,50,6,0
810 DATA28,3D,50,6,F0,80,3D,0,51
,32,61,32,51,B0,41,36,61,32,61,0
,F0,F0,70,6,0,F0,F0,50,28,3D,0,3
1,36,61,32,71,B0,A1,32,31,36,31,
0,30,6,F0,F0,D0,6,0,30,6,3D,F0,A
0,3D,0,91,32,31,36,41,B0,41,36,3
1,32,91,0
820 DATAF0,6,F0,40,6,0,10,28,70,
```

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```
39,F0,F0,70,3D,28,0,91,32,A1,B0,
41,32,81,32,41,0,F0,B0,3,FF
830 '#46
840 DATAF0,3D,F0,40,3D,0,31,36,9
1,32,81,32,81,32,91,36,31,0,30,6
,F0,3,70,33,F0,6,0,30,6,F0,F0,30
,39,70,6,0,71,32,11,36,31,F0,60,
31,32,A1,0,B0,6,0
850 DATA3E,80,6,10,28,F0,F0,3D,3
0,28,0,41,32,A1,F0,60,37,11,32,4
1,36,31,0,F0,F0,F0,40,6,0,28,3D,
F0,F0,E0,6,0,41,36,31,32,41,F0,6
0,31,36,11,32,71,0
860 DATA40,6,F0,F0,40,6,0,40,6,F
0,F0,40,6,3D,60,28,0,C1,36,21,F0
,60,81,32,21,36,11,0,C0,6,F0,F0,
60,6,0,90,3D,6,F0,F0,30,3D,6,0,5
1,32,91,F0,60,51,32,91,0,F0,60,3
,70,33,FF
870 '#47
880 DATAB0,3D,F0,C0,3D,0,31,32,2
1,36,21,32,11,35,60,37,60,35,11,
32,21,36,21,32,31,0,80,6,F0,F0,3
0,6,0,80,6,B0,C,10,39,10,3C,B0,6
,0,21,36,32,51,80,11,32,11,36,11
,32,11,80,51,32,36,21,0,20,6,F0,
60,6,F0,60,6,0
890 DATA20,6,60,28,60,28,50,6,50
,28,60,28,60,6,0,11,36,31,32,31,
60,21,32,21,36,21,32,21,60,31,32
,31,36,11,0,10,6,F0,70,6,F0,70,6
,0,10,6,3E,F0,40,6,F0,70,6,0,51,
70,91,36,71,36,91,70,51,0,F0,60,
6,70,6,0
900 DATAE0,28,3D,20,6,70,6,20,3D
,28,0,11,32,36,11,60,21,36,71,30
,71,36,21,60,11,36,32,11,0,40,6,
90,6,F0,20,6,90,6,0,28,20,6,90,6
,3D,B0,3D,6,90,6,20,28,0,81,60,7
1,32,71,32,71,60,81,FF
910 '#48
920 DATAF0,40,C,B0,3C,0,F0,30,21
,32,31,36,31,32,21,0,F0,B0,6,0,A
0,28,E0,6,E0,28,0,A0,81,32,21,30
,35,37,21,32,81,0,0,20,28,F0,70,
39,70,F0,28,0
930 DATA10,81,32,11,34,90,11,36,
11,90,34,11,32,81,0,F0,B0,6,0,A0
,3D,D0,6,D0,3D,0,30,21,36,71,32,
F1,41,32,71,36,21,0,50,6,B0,33,B
0,3,B0,6,0
940 DATA50,6,3D,F0,F0,30,3D,6,0,
30,51,32,36,11,B0,35,B0,11,36,32
,51,0,B0,6,F0,C0,6,0,40,28,50,6,
F0,C0,6,50,28,0,30,31,32,61,F0,A
0,61,32,31,0,F0,40,33,B0,3,FF
950 '#49
960 DATA28,F0,3D,F0,3D,F0,28,0,6
1,32,71,36,21,32,21,37,21,32,21,
36,71,32,61,0,F0,10,6,F0,20,6,0,
B0,3D,20,6,F0,20,6,20,3D,0,21,32
,21,36,F1,11,32,F1,11,36,21,32,2
1,0,70,6,80,3,D0,33,80,6,0,28,50
,6,F0,F0,50,6,50,28,0
970 DATA41,32,41,E0,11,32,11,E0,
41,32,41,0,0,28,70,3C,F0,F0,10,C
,70,28,0,31,36,31,32,21,B0,11,32
,11,B0,21,32,31,36,31,0,30,6,F0,
F0,D0,6,0,30,6,F0,50,39,F0,50,6,
0,81,36,11,D0,51,D0,11,36,81,0,8
0,6,F0,F0,30,6,0
980 DATA28,3D,30,6,F0,F0,30,6,30
,3D,28,0,31,32,61,D0,11,32,11,D0
,61,32,31,0,F0,30,3,D0,33,FF
990 '#50
1000 DATA28,A0,3D,80,39,F0,3E,A0
,28,0,31,36,21,32,41,32,21,35,31
,34,A0,41,32,41,36,31,0,30,6,E0,
3,F0,C0,6,0,30,6,3D,50,28,F0,F0,
10,3D,6,0,A1,32,31,B0,31,36,71,3
2,D1,0,F0,F0,6,0,E0,28,E0,6,3D,0
1010 DATA11,32,51,32,41,B0,61,32
,81,32,41,36,21,0,F0,F0,60,33,C0
,6,0,30,3C,F0,F0,F0,6,0,11,32,11
,36,51,32,11,A0,11,32,11,B0,21,3
6,32,51,0,50,6,F0,F0,70,6,0,28,3
0,6,F0,F0,70,6,3D,0
1020 DATAA1,36,31,C0,37,C0,31,36
,21,32,21,0,A0,6,F0,F0,30,6,0,70
,3D,6,F0,F0,30,6,50,28,0,35,21,3
2,61,D0,11,32,11,B0,81,32,21,0,F
0,50,33,D0,3,FF
1030 DATA0F
```

Listing 5: MAKEPROS

```
10 PCLEAR1:CLEAR50,&H31FF
20 INPUT"ARE THE PROSPECTOR PROG
RAMS ON  (T)APE OR (D)ISK";A$:A$
=LEFT$(A$,1):IFA$="D"ORA$="d"THE
N50ELSEIFA$<>"T"ANDA$<>"t"THEN20
30 CLOADM"PROS1",&HD000:CLOADM"P
ROS2",&HE000:CLOADM"SCRN1":CLOAD
M"SCRN2"
40 GOTO60
50 LOADM"PROS1",&HD000:LOADM"PRO
S2",&HE000:LOADM"SCRN1":LOADM"SC
RN2"
60 INPUT"PRESS ENTER WHEN READY
TO SAVE  COMPLETE PROGRAM";B$:IF
A$="D"ORA$="d"THEN80
70 CSAVEM"PROS",&H3200,&H76FB,&H
3200:GOTO90
80 SAVEM"PROS",&H3200,&H76FB,&H3
200
90 INPUT"PRESS ENTER TO RUN PROS
PECTOR";A$:EXEC&H3200
```

NOVICES NICHE

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Graphics

Holidays at the Hearth

16K
ECB

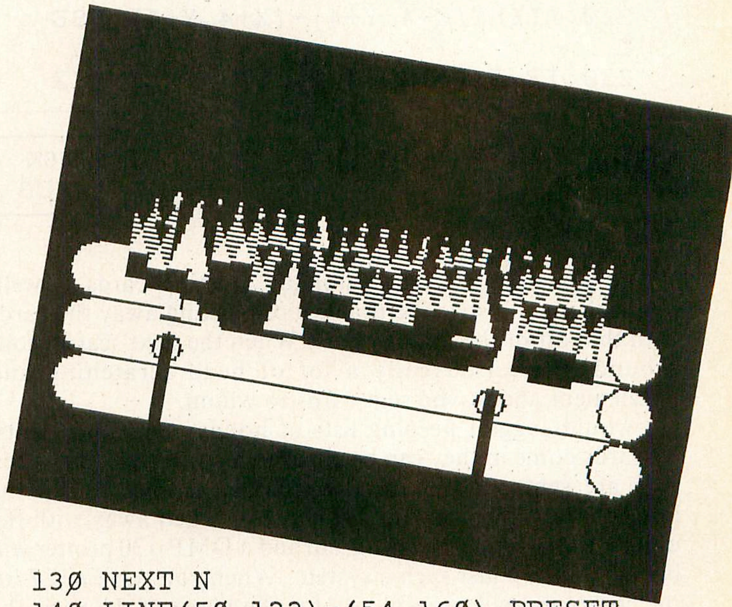
By Peter E. Davies

For those of you who don't have a fireplace, this program can allow you to huddle around the CoCo monitor for a little cozy electronic warmth during the holiday season.

Last year I sent my CoCo signal to a video recorder while running this program, then overdubbed the tape with some holiday music and mailed copies to friends who had neither a fireplace nor a CoCo.

Yule Log is drawn on the PMODE 4 screen and animated by GET and PUT commands. For an extra challenge, try to modify the program so that the logs gradually burn away over a period of time.

The listing: YULELOG



```
10 PMODE 4,1
20 SCREEN 1,1
30 PCLS
40 DIM F(15,25)
50 DIM B(15,25)
60 FOR N=100 TO 160 STEP 22
70 CIRCLE(20,N),10
80 CIRCLE(230,N),10
90 PAINT(20,N),1,1
100 PAINT(230,N),1,1
110 LINE(20,N-10)-(230,N+10),PSE
T,BF
120 CIRCLE(230,N),11,2
130 NEXT N
140 LINE(50,122)-(54,160),PRESET
,BF
150 LINE (176,122)-(180,160),PRE
SET,BF
160 CIRCLE(52,126),6,2
170 CIRCLE(178,126),6,0
180 LINE(0,25)-(7,0),PSET
190 LINE(7,0)-(14,25),PSET
200 LINE(0,25)-(14,25),PSET
210 PAINT (1,24),1,1
220 GET(0,0)-(14,25),F
230 GET(100,0)-(114,25),B
240 PUT(0,0)-(14,25),B
250 LET X=RND(195):LET R=RND(25)
260 IF X<35 THEN GOTO250
270 PUT(X,90+R)-(X+14,65+R),F
280 GOTO 250
```

Setting for One

CoCo 3

By Rick Cooper

Some people collect and display baseball cards; others, butterflies; and still others, plates. If plate-collecting is one of your hobbies, you can add another dish to your store — a Turkish plate, hand-painted by the CoCo 3.

The listing: TURKISH

```
100 ' TURKISH PLATE
110 ' BY RICK COOPER
120 ' PO BOX 276
130 ' LIBERTY, KY 42539
140 HCOLOR 1,0:HSCREEN2:POKE &HF
FD9,0
150 REM COLORS ARE FOR RGB    0=
WHITE   1 & 2=LIGHT BLUE   3=BLA
CK  4=BLUE-PURPLE    5=BROWN   6
=DARK BLUE
160 PALETTE 0,63:PALETTE 1,25:PA
LETTE 2,25:PALETTE 3,0:PALETTE 4
,14:PALETTE 5,32:PALETTE 6,1
170 J=0
180 FOR Y=20 TO 173 STEP 12
190 HCOLOR 1,0
200 FOR X=80 TO 248 STEP 12
210 HLINE(X,Y)-(X,Y+8),PSET
220 HLINE(X-4,Y+4)-(X+4,Y+4),PSE
T
230 IF J/2=INT(J/2) THEN HLINE(X
+4,Y+4)-(X+7,Y+16),PSET ELSE HLI
NE(X,Y+8)-(X+12,Y+8),PSET:HLINE(
X,Y+12)-(X+12,Y+12),PSET:HDRAW "
BM"+STR$(X+6)+","+STR$(Y+9)+"C3D
2C1"
240 IF J/2=INT(J/2) THEN HCOLOR
3,0:HLINE(X+4,Y+11)-(X+8,Y+11),P
SET:HCOLOR 1,0
250 IF J/2<>INT(J/2) THEN HLINE(
X-4,Y+4)-(X-7,Y+16),PSET
260 J=J+1
270 NEXT X
280 NEXT Y
290 FOR X=86 TO 250 STEP 12:FOR
Y=38 TO 175 STEP 12:HPAINT(X,Y),
4,1:NEXT Y,X
300 HCOLOR 5,0
310 FOR X=1 TO 4:READ A,B,C:HCIR
CLE(A,B),C:NEXT X
320 FOR X=1 TO 6:READ A,B,C,D:HP
AINT(A,B),C,D:NEXT X
330 ATTR 3,1:HPRINT (12,22),"'TU
RKISH PLATE'"
340 POKE &HFFD8,0
350 GOTO 350
360 DATA 159,96,50,159,96,60,159
,96,70,159,96,53
370 DATA 0,0,0,5,159,38,3,5,159,
28,3,5,159,38,0,5,159,45,6,5,10,
10,1,5
```

Keeping a Card Count

16K
ECB

By Ernie Thompson

The practice of sending holiday greeting cards is well-established, and so is the practice of packing away the cards with the rest of the holiday gear. When the next season rolls around, there is usually a lot of head scratching and puzzlement about who sent cards to whom.

I would suggest keeping lists of holiday correspondents. As cards come in they can be checked as received. And when they are sent out they can be marked as sent. When the holiday season is over, the list can be packed away with the other holiday items. My program and a DMP-130 printer will help you set up just such a system. When you run *Card List*, the computer will prompt you for the name of the user, the list number and the year. The printer will then print out a blank 29-line, four-column form (name, address, "sent" and "received" columns).

If you do not have a DMP-130 printer, don't worry; other DMP models should work. When you get ready to print, make sure that the edge of the paper is even with the print head.

The listing: CARDLIST

```
10 PRINT#-2,CHR$(27);CHR$(28)
20 CLS:PRINTTAB(4);"CHRISTMAS CA
RD LIST PRINTER"
30 PRINTTAB(8);" BY ERNIE THOMPS
ON"
40 PRINT@132,"PRINT NAME....": I
NPUT K$
50 INPUT"PRINT LIST NO.";H
60 PRINT#-2,"CHRISTMAS CARD LIST
 NO.";H;"OF..";K$;"..FOR":PRINT#
-2,STRING$(62,232)
70 CLS:INPUT"PRINT YEAR";D$
80 PRINT#-2,CHR$(27);CHR$(14);CH
R$(27);CHR$(19);CHR$(27);CHR$(31
)
90 PRINT#-2,TAB(13);"DECEMBER.."
;D$
100 PRINT#-2,CHR$(27);CHR$(15);C
HR$(27);CHR$(32)
110 PRINT#-2,STRING$(76,229)
120 PRINT#-2,TAB(6)"NAME";STRING
$(24,224);"ADDRESS";STRING$(20,2
24);"SENT";STRING$(5,224);"R'CD.
"
130 CLEAR1000
140 FOR Y=1TO29
150 CLS3:PRINT@329,"W O R K I N
G:";
160 A=18:B=38:C=8
170 D=244:E=241:F=250:G=249
180 PRINT#-2,CHR$(D);STRING$(A,2
41);CHR$(F);STRING$(B,241);CHR$(
F);STRING$(C,241);CHR$(F);STRING
$(C,241);CHR$(G)
190 FORX=1TO3
200 A$=CHR$(245)
210 PRINT#-2,A$;STRING$(A,224);A
$;STRING$(B,224);A$;STRING$(C,22
4);A$;STRING$(C,224);A$
```

```
220 NEXTX
230 NEXT Y
240 PRINT#-2,CHR$(246);STRING$(A
,241);CHR$(248);STRING$(B,241);C
HR$(248);STRING$(C,241);CHR$(248
);STRING$(C,241);CHR$(247)
250 CLS3:PRINT@331,"DONE PRINTIN
G";:PRINT@387,"N0. OF LINES PRIN
TED=..";Y-1;:PRINT#-2,"NO. OF LI
NES PRINTED=..";Y-1;:PRINT#-2,ST
RING$(6,10):PRINT@453,"MORE COPI
ES?-<ANY KEY>";:EXEC44539:CLS:GO
TO40"RUN
```

Utility

Hacker, Beware

16K
ECB

By Steve Knapik

Does your kid sister mess in your files? This'll keep her out, at least for a little while. *Lockout* adds password-protection to your sensitive programs — and, as a bonus, offers an attractive title screen.

Just merge your existing program with *Lockout*, but make sure there are no duplicate line numbers or variables. You may have to rename variables and renumber lines with the `RENUM` command. Also, make sure that your program begins at Line 100 and ends before Line 9800.

When you boot your modified program (or this listing), you are greeted with a title screen that prompts you to press the space bar and then to enter a password. CoCo will not echo your keypresses on the screen, so you don't have to worry about someone across the room learning the password. If you supplied the correct password, the program begins. If you didn't, the program terminates.

To personalize the title screen for your program, edit lines 9830 and 9835 (with the `EDIT` command) to add the program title and the date of the program's creation. You are limited to about nine or 10 characters for both the title and the date — make sure you don't add any extra spaces within the quotes, because that will throw off alignment for the title screen.

As of now, the password is `LOKOUT`. If you want to change the password, just examine the program lines containing `BQ$` strings. The character codes are the simple secret to this protection program. With any luck, you'll have staved off your pesky kid sister for a week or two.

The listing: `LOCKOUT`

```
1 REM  LOKOUT
2 REM  1.297 K
5 GOSUB 9800
10 REM ************************
15 REM     PROGRAM   LINES
20 REM ************************
25 CLS : X=-1 : XA=0
30 X=X+1 : IF X=32 THEN 40
35 PRINT @ X,CHR$(128); : GOTO 3
0
40 PRINT @ 10,"enter"; : PRINT @
 16,"code";
45 X=-1 : XA=XA+1 : IF XA<4 THEN
 30
50 BQ$=BQ$+CHR$(85) : XA=0
55 A$=INKEY$:IF A$<>"" THEN 65
60 GOTO 55
65 XA=XA+1 : SOUND 220,1
70 BZ$=BZ$+A$ : IF XA<6 THEN 55
75 IF BZ$=BQ$+CHR$(84) THEN 100
80 CLS:PRINT:PRINT" >> P R O G R
 A M"
85 PRINT"     T E R M I N A T E D
"
90 NEW
95 END
100 CLS
9800 REM  *********************
9805 REM     PROGRAM  LOGO
9810 REM  *********************
9815 WIDTH 32 : MK=22824-MEM : M
K=MK/1000
9820 A$="###.#" : CLS(3) : GOSUB
 9940
9825 PRINT @ 71," PROGRAM  LOADE
D ";
9830 PRINT @ 167," TITLE:
   ";
9835 PRINT @ 231,"  DATE:
   ";
9840 PRINT @ 295," MEMORY: ";
9845 PRINT USING A$;MK;
9850 BQ$=CHR$(76)+CHR$(79) : PRI
NT" K ";
9855 PRINT @ 354,"  SPECIAL  IN
STRUCTIONS    ";
9860 IF PEEK(65314)=4 THEN A$="P
RINTER IS READY  "
9865 IF PEEK(65314)=5 THEN A$="T
URN ON PRINTER    "
9870 PRINT @ 386,"   ===>   "A$;
: SOUND 200,01
9875 GOSUB 9940
9880 BQ$=BQ$+CHR$(75) : X=-1
9885 X=X+1 : IF X=32 THEN 9900
9890 PRINT @ X,CHR$(128);
9895 GOTO 9885
9900 PRINT @ 7,"protected";
9905 PRINT @ 17,"program";
9910 FOR T = 1 TO 65 : NEXT T
9915 X=-1 : XA=XA+1 : IF XA<4 TH
EN 9885
9920 PRINT @ 451,"PRESS SPACE BA
R TO BEGIN";
9925 BQ$=BQ$+CHR$(79)
9930 IF INKEY$ <> " " THEN 9930
9935 SOUND 200,5 : RETURN
9940 FOR T = 1 TO 300 : NEXT T :
 RETURN
```

Home Help

News Flash! News Flash!

4K

By Keiran Kenny

Whether it's Wall Street, Times Square or Piccadilly Circus, in any big city you'll always find a continuous news bulletin. To make your own newsreel for the CoCo, just put your messages into strings labelled `W$`, as in lines 110 through 150 of the listing. Use the asterisk to separate news items. The entry `DL=100` in Line 20 sets the speed of the display. You can increase that number to speed the display up or decrease it to slow it down.

The listing: NEWSREEL

```
10 CLS
20 DL=100
30 CLS0:GOTO90
40 P=224:FORZB=1TOLEN(W$):Y$=Y$+
MID$(W$,ZB,1)
50 PRINT@P,Y$
60 IFLEN(Y$)/32=INT(LEN(Y$)/32)T
HENY$=RIGHT$(Y$,LEN(Y$)-1):FORD=
1TODL:NEXT:NEXTELSEFORD=1TODL:NE
XT:NEXT
70 PRINT@P,Y$;
80 RETURN
90 PRINT@237,"one"+CHR$(128)+"mo
ment"+CHR$(128)+"please";
100 FORD=1TO32:W$=W$+CHR$(128):N
EXT:GOSUB40
110 W$="THE NEWSREEL PROGRAM, BY
 KEIRAN KENNY, SYDNEY, 1988***":
GOSUB 40
120 W$="GET YOUR MESSAGE ROLLING
 ON NEWSREEL***SENSATION! TANDY
ANNOUNCES 640 MEGABYTE COCO 4. R
EFUSES TO CONFIRM PENTAGON OFFER
ED TRADE-IN IBM 30000'S***":GOSU
B 40
130 W$="COCO CAT ON STRIKE! SAYS
 MAXWELL MOUSE GOES OR I GO! HE'
S INEDIBLE!***":GOSUB40
140 W$="I'VE LOST COUNT, SAID FI
LM STAR GLITTER GLAMMA WHEN ASKE
D HOW MANY HUSBANDS SHE HAD HAD*
**":GOSUB40
150 W$="WEATHER REPORT: STORM, W
IND, RAIN, HAIL, TORNADOES, OTHE
RWISE FAIRLY PLEASANT. LONG-TERM
 FORECAST BLEW AWAY***STOCK MARK
ET: ALL ORDINARIES UP. ALL EXTRA
ORDINARIES DOWN***":GOSUB40
1000 GOTO110
```

Game

And for My Next Trick . . .

4K

By Paul Ruby, Jr.

A quick shuffle of the cards — and nothing up my sleeve — just pick a card, any card. CoCo the Magnificent will mystically tell you which card you chose.

An ordinary deck of 52 unmarked cards will be placed in four columns. All you have to do is pick a card and tell CoCo which of the four columns the card is in. CoCo will then reshuffle and deal the cards into another four columns. Again, you indicate which column the card is in. The procedure is repeated twice more, and CoCo will reveal your card.

All doubters come forward and pick a card, any card . . . .

The listing: CARDTRIK

```
0 '*****************************
1 '**                         **
2 '**       CARD TRICK        **
3 '**     PROGRAMMED BY:      **
4 '**     PAUL RUBY, JR.      **
5 '**                         **
6 '**   COPYRIGHT (C) 1987    **
7 '**                         **
8 '*****************************
10 DIM CD$(52),S1$(13),S2$(13),S
3$(13),S4$(13)
20 FOR A=1 TO 52:READ CD$(A):NEX
T
30 CT=0:FOR A=1 TO 100:B=RND(52)
:C=RND(52):Z$=CD$(B):CD$(B)=CD$(
C):CD$(C)=Z$:NEXT
40 C=1:FOR A=1 TO 13:S1$(A)=CD$(
C):S2$(A)=CD$(C+1):S3$(A)=CD$(C+
2):S4$(A)=CD$(C+3):C=C+4:NEXT
50 PRINT TAB(5);"-1-";TAB(10);"-
2-";TAB(15);"-3-";TAB(20);"-4-"
60 FOR A=1 TO 13
70 PRINT TAB(5);S1$(A);TAB(10);S
2$(A);TAB(15);S3$(A);TAB(20);S4$
(A)
80 NEXT
90 PRINT "WHICH STACK (1,2,3,4)?
";
100 A$=INKEY$:IF A$<"1" OR A$>"4
" THEN 100
105 PRINT
110 ON VAL(A$) GOSUB 200,210,220
,230
120 CT=CT+1:IF CT<4 THEN 40
130 CLS:PRINT "YOUR CARD IS ";CD
$(1);
```

```
140 END
200 C=14:FOR A=1 TO 13:CD$(C)=S2
$(A):CD$(C+1)=S3$(A):CD$(C+2)=S4
$(A):C=C+3:NEXT:C=1:FOR A=1 TO 1
3:CD$(C)=S1$(A):C=C+1:NEXT:RETUR
N
210 C=14:FOR A=1 TO 13:CD$(C)=S1
$(A):CD$(C+1)=S3$(A):CD$(C+2)=S4
$(A):C=C+3:NEXT:C=1:FOR A=1 TO 1
3:CD$(C)=S2$(A):C=C+1:NEXT:RETUR
N
220 C=14:FOR A=1 TO 13:CD$(C)=S1
$(A):CD$(C+1)=S2$(A):CD$(C+2)=S4
$(A):C=C+3:NEXT:C=1:FOR A=1 TO 1
3:CD$(C)=S3$(A):C=C+1:NEXT:RETUR
N
230 C=14:FOR A=1 TO 13:CD$(C)=S1
$(A):CD$(C+1)=S2$(A):CD$(C+2)=S3
$(A):C=C+3:NEXT:C=1:FOR A=1 TO 1
3:CD$(C)=S4$(A):C=C+1:NEXT:RETUR
N
500 DATA AH,1H,2H,3H,4H,5H,6H,7H
,8H,9H,TH,JH,QH,KH,AD,1D,2D,3D,4
D,5D,6D,7D,8D,9D,TD,JD,QD,KD
510 DATA AC,1C,2C,3C,4C,5C,6C,7C
,8C,9C,TC,JC,QC,KC,AS,1S,2S,3S,4
S,5S,6S,7S,8S,9S,TS,JS,QS,KS
```

Music

Play Your Piano

By Gip Wayne Plaster

16K
ECB

CoCo Keyboard is a short program that transforms the bottom two rows of your CoCo keyboard into a one-octave piano. The X, C, V, B, N, M and the comma keys serve as the "white" keys on a piano keyboard, and the D, F, H, J and K keys correspond to the "black" notes, or half-tones.

Not only does *CoCo Keyboard* allow you to control the pitch of a note, but also the octave — the up arrow key raises the octave and the down arrow key lowers it; five octaves are offered. The length of a tone is fixed, which means, for example, that you can't make a note play continuously by holding your finger down on a key. But you can change the duration of the note with the left and right arrow keys, to make it longer or shorter (left arrow key makes the note longer, right arrow key shortens it). Finally, the Q and A keys change the volume (Q raises it and A lowers it) — 1 to 31; but be sure you do not go too high or too low or you will get an error. The starting values include an octave of 1, a length of 1 and a volume of 15.

Once you get used to *CoCo Keyboard*, you can play the notes with your right hand while adjusting octave and note length with your left hand. For fun, after you type in and save the listing, see if you can figure out these melodies:

XBBBNMMMMNMKVNB
VVV VVV VNXCV
BBBBBVVVVCCVC N
VVV VVV VNXCV BBBBBVV
NNBCX
NNN NNVN NNN NNBN N,,,M
MNNNB VVVVCCCCX

Happy Holidays!

The listing: KEYBOARD

```
10 ' PROGRAM NUMBER 0788-2
20 ' COCO KEYBOARD * GIP PLASTER
30 CLS
40 FORA=1TO4:PRINTSTRING$(32,"*"
);:NEXTA
50 PRINT@40,"RAINBOW MAGAZINE";
60 PRINT@76,"PRESENTS";
70 PRINT@167,"the co co keyboard
"
80 PRINT@198,"BY GIP WAYNE PLAST
ER"
90 PRINT@262,"d   f      h   j
k"
100 PRINT@324,"X   C   V   B   N
 M  ,"
110 PRINT@388,"UP & DOWN      ---
 OCTAVE"
120 PRINT@420,"LEFT & RIGHT ---
 LENGTH"
130 PRINT@452,"Q & A          ---
 VOLUME"
140 PLAY"O1;L1;V15"
150 Q$=INKEY$:IFQ$=""THEN150
160 IFQ$="X"THENA$="1"ELSEIFQ$="
C"THENA$="3"ELSEIFQ$="V"THENA$="
5"ELSEIFQ$="B"THENA$="6"ELSEIFQ$
="N"THENA$="8"ELSEIFQ$="M"THENA$
="10"ELSEIFQ$=","THENA$="12"ELSE
IFQ$="D"THENA$="2"ELSEIFQ$="F"TH
ENA$="4"ELSEIFQ$="H"THENA$="7"
170 IFQ$="J"THENA$="9"ELSEIFQ$="
K"THENA$="11"
180 IFQ$=CHR$(94)THENA$="O+"ELSE
IFQ$=CHR$(10)THENA$="O-"ELSEIFQ$
=CHR$(8)THENA$="L-"ELSEIFQ$=CHR$
(9)THENA$="L+"ELSEIFQ$="Q"THENA$
="V+"ELSEIFQ$="A"THENA$="V-"
190 PLAY"XA$;"
200 GOTO150
```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

Animate your graphics

Shall We Dance?

By Joseph Kolar
Rainbow Contributing Editor

Last month, I left you with the prints of two pairs of shoes. This month, we will use our shoes to demonstrate the box step and sharpen our programming skills.

You were asked to design prints for a woman's shoes. If you followed the same procedure we used for the pair of men's shoes, you will need to reverse the women's shoes. We need the pairs to face each other so that they can dance.

At times when I move through a tutorial, I pass over material without fully explaining it. I do this for two reasons. First, it is easy to follow a thought down a byway and move away from the main subject. Second, you are forced to think out situations and come up with a logical conclusion. These tutorials are not exercises in copying listings. You may learn by following instructions, but you really understand something when you figure it out on your own.

Once you have reversed the second pair of shoes, we are ready to begin this tutorial.

The `DRAW` statement (with assistance from the `LINE` and `PAINT` statements) will be used to create our depiction of a box step. After you have seen what I have created, you may want to modify the program to suit your own interpretation of this dance step.

Listing 1 generates our footprints. String `A$` contains the left print and String `B$` contains the right, in lines 20 and 30 respectively. The woman's footprints are found in lines 40 and 50 and are contained in strings `C$` and `D$`. The two sets of prints face each other. When the man's left foot leads, String `A$` moves that print, and String `C$` moves the woman's right print.

Before we continue this lesson in animation (yes, this is an animated program), load *Graph Paper* and check the contents of Line 40 to see the print that is created and the way this is accomplished.

Briefly, to create the reversed prints for lines 40 and 50, the work created in your original women's prints was rotated 180 degrees. To do this, add `A2` to the `DRAW` instructions. You must also adjust the locating coordinates to return to the desired position. To do this, add `+12` to the horizontal coordinate and `+30` to the vertical coordinate. You must then make a similar change to all `PAINT` locations. `LINE` statement locations are not affected. Please note that if the heel is not centered on your six-by-15 *canvas* (so to speak), you may need to pick new points within the heel with `PSET`. If you must make any changes, save them.

Once we have finished these modifications, we no longer need *Graph Paper*. It has served its purpose — creating footprints and supplying the data for this tutorial's `DRAW` statements.

Look at Listing 1 and type in lines 10 through 100 and Line 1000 (our hold line). Run the program.

Look at lines 20 through 50, which contain the strings for the footprints. Each string ends with `E` — the movement that completes the shoe outline and returns to the beginning of the drawing. However, Line 20 (the man's left footprint) adds `BR7` to the end of `A$`, and Line 40 (the woman's right footprint) adds `BR5` to the end of `C$`. These string commands leave a space between the shoes in each pair. Because the two sets of shoes are of different sizes, the space between each pair different.

Line 100 reflects our creation of a reasonably small (`S8`) man's left shoe, which was painted (`C1`) and was centered in the middle of the screen. What if we remove `BM128,96`? Because `128,96` are the default coordinates of `DRAW`, CoCo will use these coordinates if you do not include your own. Now omit `C1`, the default color, as well. Finally, remove `S8` (which CoCo will replace with the default size, `S4`). Run the program.

The runaway painted screen you now see was caused by the `PAINT` locations for the shoe's heel, which were located outside the new `S4` shoe size. Replace `S8C1BM128,96`. The multiple statement that follows this contains the `PAINT` coordinates for the heel.

Please note: You could have painted your shoes in any number of ways — soles only, heels only, etc. If you painted the entire shoe (including heel) the same color, you could have removed one `PAINT` statement per shoe. I chose to paint only the heel, to give the illusion of upper and lower brackets, and to accent the print — not overwhelm it. Other combinations could be equally effective. (Decisions! Decisions!)

Type in Line 101. `DRAWB$` attaches `B$` to the end of `A$`. Because we gave CoCo no new instructions, it assumed that it should link the strings. Prove this by deleting `DRAWB$` and joining the two strings in Line 100. Run the program. If you want, you may now join the rest of Line 101 to the end of Line 100 and delete Line 101.

Return lines 100 and 101 to their original state, and type in lines 102 and 103. These two lines contain the data for the woman's footprints. Next, enter Line 140. This line contains a very useful command. Now you may press any key except `BREAK` to continue. This command is a very convenient motion-stopper, which allows you to look at a particular dance position. Run the program and then press `BREAK`.

From this initial position, we will place the man's left foot, `A$`, next to the woman's left foot. Then we will move the woman's right foot, `C$`, one step away from the man's left foot. Now we must erase the original `A$` and `C$`.

To do this, type in lines 150 and 151. Run the listing, and then press any key. `A$` and `C$` both vanish.

Look at Line 150. We use the `LINE` statement found there to paint over (`BF`) `A$`'s location in the the background color, `PRESET`. The starting coordinates are found in Line 100. Remember that when drawing each print, we started in the left corner. To find the ending coordinates, consider the left corner's coordinates (0,0). Next, multiply each element in our shoe size (8,20) by two. The results are 16 and 40. Because the print is on the right (or positive) side of our screen, add +16 to the horizontal coordinate (128) for a total of 144, and add +40 to the vertical coordinate (96) for a total of 146. This gives us the

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Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

closing coordinates (144,146). The invisible box that we created in Line 150 covers `A$`. This is one way to erase the footprint.

Line 151 completes the same process for `C$`. Just substitute the coordinates (6,15) for (8,20) and follow the same steps. (No pun intended.)

Enter lines 200, 201 and 210. Line 200 moves the woman's right footprint up an arbitrary number of units (-40) on the vertical axis; Line 201 completes the same move for the man's right footprint. Neither line causes the prints to move horizontally.

The next movement will bring the man's right foot up, next to the left foot, and move the right foot to the right.

Enter Line 250 and run the program. `D$`, the woman's left footprint, was erased. (I lost track of feet at this point and began tacking on `REM` statements at the end of the program lines. Some of the remarks may be incorrect, but it's a confusing program.) Line 251 will place the woman's left footprint (`D$`) next to the right footprint. Enter that line and run the program. Lines 260 and 261 do the same thing to the man's footprints. Enter these lines and run the program.

This dance position is temporary; both `B$` and `D$` will move to the right. To indicate this, we will enter Line 262, which adds a short pause at this point. (Don't bother to run the program at this point; it would be a waste of time.)

For our next step, we must erase `D$`. This time, let's use a `DRAW` statement to erase the print and compare the results with those of a `LINE` statement. After all, there's more than one way to do anything. Right?

Enter Line 300. Compare this line to Line 251 by first listing and then entering each line. Line 251 (which placed `D$` in its last position) is copied into Line 300. We will copy the line exactly *except* that we will change Color 1 to Color 0 in three places. When you run Line 300, `DRAW` will paint over Line 251 in the background color, making the print disappear.

This method seems simpler than the line method. (Can you guess which method I prefer?) To avoid confusion, let's add `ON` and `OFF` as `REM` statements to the end of multiple-program `DRAW` lines.

Line 301 will move `D$` to the right 40 units on the horizontal axis. The print's position on the vertical axis is unaffected. Enter line 301 and run it a few times. Next enter lines 310, 320 and 340. `B$` has been erased and moved under `D$`. (`B$`, the man's right foot, moved 42 units to the right in order to be centered under `D$`.) Now run the listing.

Next we must erase `C$` and `A$` and move them next to `D$` and `B$` respectively. To do this, enter lines 350, 351, 400, 401 and 410. Both `C$` and `A$` were erased in lines 350 and 351, and moved to the new location in lines 400 and 401. Moving the two prints simultaneously makes the action smoother.

Congratulations! Your footprints have just completed one-half of the box-step. Finish entering the listing. To get the full benefit of the tutorial, enter and run the lines of the listing one at a time. This will help you to fully understand this animation technique.

Look at Line 750. At this point, we have returned to our original print positions. In order to have a smooth rerun, go to the location that erases and relocates `A$`. If you change Line 750 to `GOTO 100` instead of `GOTO 150` and run the listing, a jerking pause and misplaced foot (`D$`) appear. These problems are not seen when Line 750 reads `GOTO 150`. This would be a good time to debug this minor problem, but, if you're like me, you won't worry about it.

This was the step-through version of our program. To view the animated version, add the following `GOSUB` routine:

```
2000 FOR Z+1 TO 1000: NEXT:
RETURN
```

Edit lines 140, 210, 340, 410, 470 and 610 to read:

```
GOSUB2000
```

Edit Line 750 to read:

```
GOSUB2000:GOTO150
```

Run the listing and then press BREAK.

You can give your dancers a beat of sorts by inserting the following line at the beginning of the program:

```
SOUND100,2
```

When you run the program, you will see that the movement now seems a little jerky. Just change the pause count in Line 2000 to `500` instead of `1000`. Now, if you want to see see your dancers *really* move, change the pause count to `1`, and mask lines 262 and 609. Now run the listing.

Now you know *one* way to animate.

The program looks pretty good this way. The `SOUND` statement acts as a

A CoCo Christmas

T'was the night before Christmas,
And all through the house
Not a peripheral was active,
Not even the mouse.

The disk drives were quiet,
The keyboard was still,
On the printer and modem
Activity was nil.

The lights were shut off,
The power shut down,
The computer looked lonely
For there was no one around.

So for the Color Computer,
This night was no fun.
CoCo didn't like sitting
With no programs to run.

Then the next morning,
The lights were turned on.
In rushed the children,
The silence was gone.

On went the power,
Which turned on the rest.
The Color Computer
Was now at its best.

Then from that room
Such sounds did arise,
Of young children's laughter
And exclamatory cries.

The monitor shone,
With colors so true.
The reds were so red,
And the blues were true blue.

The Color Computer
Ran on through the day,
But soon came the time
To put it away.

So off went the power,
And off went the light,
So to you from the CoCo —
Have a wonderful night.

Ken Murray
Cornwall, Ont.

*** *** *** *** COLOR COMPUTER III SOFTWARE *** *** *** ***

CBASIC III EDITOR/COMPILER

The ULTIMATE Color Computer III BASIC COMPILER!!!

If you want to write fast efficient machine language programs and you don't want to spend the next few years trying to learn how to write them in Assembly language or with a cheap compiler, then CBASIC III is the answer!!!

CBASIC III is the only fully integrated Basic Compiler and Program Editing System available for the Color Computer 3. It will allow you to take full advantage of all the capabilities available in your CoCo-3 including 512K RAM, without having to spend years trying to learn assembly language programming. CBASIC III allows you to create, edit and convert programs from a language you are already familiar with Enhanced Disk Color Basic, into fast efficient machine language programs easily and quickly. CBASIC III supports all the enhanced hardware available in the CoCo-3, including Hi-Res Graphics, & Screen displays, Extended Memory and Interrupts (Keyboard, Timer, Serial & Clock). We even added advanced commands not available in Basic to give you a level of control only avialable to very advanced Machine Language Programmers. Plus we made it exceptionally easy to use, not like some other compilers. CBASIC III is the friendliest and easiest compiler available for the Color Computer III.

CBASIC III is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP Register, memory allocations and so on, because CBASIC III will handle it for you automatically. For Advanced users, CBASIC III will let you control every aspect of your program, even generating machine code directly in a program easily.

CBASIC III features well over 150 Compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. It supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Enhanced Color Basic, including Graphics H/GET, H/Put, H/Play and H/DRAW, all with 99.9% syntax compatibility. CBASIC III also supports the built in Serial I/O port with separate programmable printer & serial I/O baud rates. You can send and receive data with easy to use PRINT, INPUT, INKEY, GETCHAR and PUTCHAR commands.

CBASIC makes full use of the powerful and flexible GIMI chip in the Color Computer 3. It will fully utilize the 128K of RAM available and install 2 Ultra Fast Ramdisks if 512K is available, for program Creation, Editing and Compilation. You can easily access all 512K of memory in a Compiled program thru several extended memory commands that can access it in 32K or 8K blocks and single or double bytes.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing Basic programs. It has block move and copy, program renumbering, automatic line number generation, screen editing, printer control and much more.

The documentation provided with CBASIC III is an 8 1/2 by 11 Spiral Bound book which contains approximatly 120 pages of real information. We went to great lengths to provide a manual that is not only easy to use and understand, but complete and comprehensive enough for even the most sophisticated user.

CBASIC III is the most expensive Color Basic Compiler on the market, and well worth the investment. You can buy a less expensive compiler for your CoCo-3, and then find out how difficult it is to use, or how limited its features are. Then you'll wish you had bought CBASIC III in the first place. Dollar for dollar, CBASIC III gives you more than any other compiler available. If you can find a better CoCo-3 Basic Compiler then buy it!!!

Requires 128K & Disk $149.00

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SUPER SMART TERMINAL PROGRAM

AUTOPILOT & AUTO-LOG PROCESSORS
X-MODEM DIRECT DISK FILE TRANSFER
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- No lost data even at 2400 Baud on the COCO-3 Serial I/O port.
- 8 Display Formats, 32/40/64/80 columns at 192 or 225 Res.
- 50K Text Buffer when using the Hi-Res Text Display & Disk.
- ASCII & BINARY disk file transfer support via XMODEM.
- Directly record receive data to a disk file (Data Logging).
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- VT-100/52 cursor keys, position, insert/delete, PF & Alt. keys.
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- Complete Full and Half Duplex operation, with no garbled data.
- 9 Variable length, Programmable Macro Key buffers.
- Programmable Printer rates from 110 to 9600 baud.
- Send Files directly from the Buffer, Macro Keys or Disk.
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- Built in Command Menu (Help) Display.
- Built in 2 Drive Ramdisk for 512K RAM support and much more.

Supports: R.S. Modem-Pak & Deluxe RS-232 Pak, even with Disk.

Requires 128K & Disk, $59.95

EDT/ASM III

128/512K DISK EDITOR ASSEMBLER

EDT/ASM III is a Disk based co-resident Text Editor & Assembler. It is designed to take advantage of the new features available in the CoCo-3 with either 128K or 512K of memory. It has 8 display formats from 32/40/64/80 columns by 24 lines in 192 or 225 Resolution, so you use the best display mode whether you are using an RGB or Composite monitor or even a TV for your display. Plus you can select any foreground or background colors or even monochrome display modes. It will even support 512K by adding an automatic 2 drive Ultra Fast Ramdisk for lightning fast assembly of program source code larger than memory. There is also a free standing ML Debug Monitor, to help you debug your assembled programs. EDT/ASM III has the most powerful, easy to use Text Editor available in any Editor/Assembler package for the Color Computer.

- Supports Local and Global string search and/or replace.
- Full Screen line editing with immediate line update.
- Easy to use Single keystroke editing commands.
- Load & Save standard ASCII formatted file formats.
- Block Move & Copy, Insert, Delete, Overtype.
- Create and Edit files larger than memory.

The Assembler portion of EDT/ASM III features include:

- Supports the full 6809 instruction set & cross assembles 6800 code.
- Supports Conditional IF/THEN/ELSE assembly.
- Supports Disk Library file (include) up to 9 levels deep.
- Supports standard Motorola assembler directives.
- Allows multiple values for FCB & FDB directives (unlike R.S. EDT/ASM)
- Allows assembly from the Editor Buffer, Disk or both.

Requires 128K & Disk $59.95

TEXTPRO IV

"The ADVANCED COCO-3 Word Processing System"

- 9 Hi-Res Displays from 58 to 212 columns by 24 lines in 225 Res.
- On Screen Display of Bold, Italic, Underline & Double Width print.
- Up to 8 Proportional Character Sets Supported with Justification.
- Up to 80 Programmable Function Keys & Loadable Function key sets.
- Fully Buffered keyboard accepts data even duiring disk access.
- Autoexecute Startup files for easy printer & system configuration.
- 8 Pre-Defined Printer function commands & 10 Programmable ones.
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- Disk file record access for Mail Merge & Boiler Plate printing.
- Completely Automatic Justification, Centering, Flush left & right.
- Change indents, margins, line length, etc. anytime in the text.
- Create and Edit files larger than memory, up to a full disk.
- Easily imbed any number of printer format and control codes.
- Built in Ultra Fast 2 drive RAMDISK for 512K support.

TEXTPRO IV is the most advanced word processing system available for the COCO-3, designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, and never expect to use multiple fonts or proportional spacing, then most likely you'll be better off with one of the other simpler word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formatting problems and letter writing, then TEXTPRO IV is what your looking for. It works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 70 different formatting commands you can use without ever leaving the text your working on. There are no time comsuming, and often frustrating menu chases, you are in total control at all times. You can see what the formatted document will *look like* before a single word is ever printed on your printer. Including margins, headers, footers, page numbers, page breaks, column formatting, justification, and Bold, Italic, Underline, Double Width, Superscript and Subscript characters right on the screen.

TEXTPRO IV can even support LASER PRINTERS with proportional fonts, take a good look at this AD? It was done with TEXTPRO IV on an OKIDATA LASERLINE-6 laser printer!!! All the character sets used on this AD are proportional spaced characters, all centering, justification, and text printing was performed automatically by TEXTPRO IV.

Requires 128K & Disk $89.95

HI-RES III Screen Commander

The DISPLAY you wanted but didn't get on your CoCo-3

- 54 Different Character Sizes available from 14 to 212 cpl.
- Bold, Italic, Underline, Subscript, Superscript and Plain character styles.
- Double Width, Double Height and Quad width characters.
- Scroll Protect form 1 to 23 lines on the screen.
- Mixed Text & Graphics in HSCREEN 3 mode.
- PRINT @ is available in all character sizes & styles.
- Programmable Automatic Key repeat for fast editing.
- Full Control Code Keyboard supported.
- Selectable Character & Background color.
- Uses only 4K of Extended (2nd 64K) or Basic RAM.
- Written in Ultra Fast Machine Language.

HI-RES III will improve the standard display capabilities of the Color Computer 3, even the 40 and 80 column displays have several features missing. For example, you can't use PRINT @ or have different character sizes on the same screen, even when mixing text and graphics with the HPRINT command. Hi-RES III can give you the kind of display you always dreamed about having on your CoCo-3, with a wide variety of display options that you can easily use with your Basic or ML programs.

HI-RES III is totally compatible with Enhanced Color Basic and its operation is invisible to Basic. It simply replaces the normal screen display with an extremely versatile display package. With the full control code keyboard, you can control many of HI-RES III extended functions with just a couple of simple keystrokes.

Requires 128K Tape or Disk $34.95

512K RAMDISK & MEMORY TESTER

RAMDISK is an ALL Machine Language program that will give you 2 ULTRA High Speed Ram Disks in you CoCo-3. It does not need or require the OS-9 operating system. It works with R.S. DOS V1.0 or V1.1 and it is completely compatible with Enhanced Color Disk Basic! Plus it allows your CoCo-3 to run at double speed all the time even for floppy disk access!!! It will not disappear when you press reset like some other ramdisk programs. The MEMORY tester is a fast ML program to test the 512K ram. It performs several bit tests as well as an address test so you know that your 512K of memory is working perfectly.

Requires 512K & Disk $19.95

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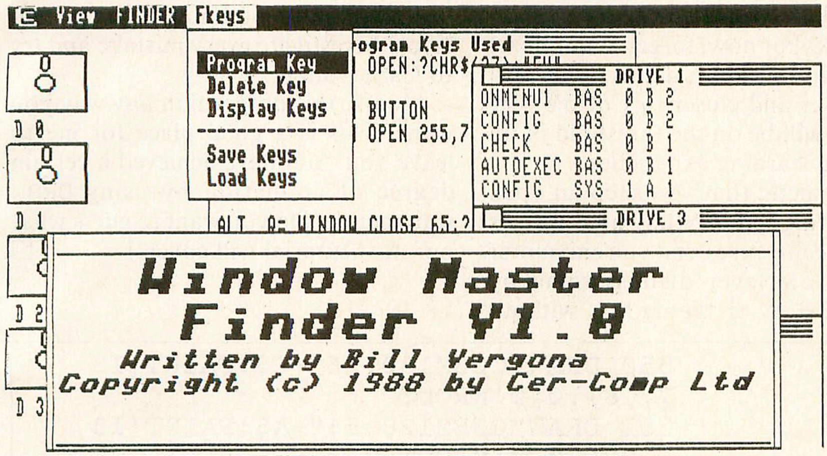
"Window Master"



```
OPEN:?CHR$(27);"EW"
BUTTON
OPEN 255,7
ALT  A= WINDOW CLOSE 65:?
```

```
ONMENU1  BAS  0 B 2
CONFIG   BAS  0 B 2
CHECK    BAS  0 B 1
AUTOEXEC BAS  0 B 1
CONFIG   SYS  1 A 1
```

Window Master
Finder V1.0
Written by Bill Vergona
Copyright (c) 1988 by Cer-Comp Ltd

Screen Display Fonts

Window Master supports up to 54 different character sizes on the screen with 5 different character styles. You can have Bold, Italic, Underlined, Super-Script, Sub-script or Plain character styles or any combination of them in any character size. You can also change the text color and background at any time to get really colorful displays.

Fully Basic Compatible

Window Master is fully compatible with Enhanced Color Disk basic with over 50 Commands & functions added to fully support the Point & Click Window System. Window Master does not take any memory away from Basic, so you still have all the Basic Program memory available.

Hi-Resolution Displays

Window Master uses the full potential of the Color Computer 3 display by using the 225 vertical resolution display modes instead of the 192 or 200 resolution modes like most other programs. It uses either the 320/16 color mode or the 640/4 color display to give you the best display resolution possible, and can be switched to either mode at any time.

Mixed Text & Graphics

Window Master fully supports both Text & Graphics displays and even has a Graphics Pen that can be used with HLINE, HCIRCLE, HSET and more. You can change the Pen width & depth and turn it on or off with simple commands. We also added Enhanced Graphics Attributes that allow graphics statements to use And, Or, Xor and Copy modes to display graphic information. With the Graphics enhancements added by Window Master, you could write a "COCOMAX" type program in Basic! In fact we provide a small graphics demo program written in Basic.

Event Processing

Window Master adds a powerful new programming feature to Basic that enables you to do "Real Time" Programming in Basic. It's called Event Trapping, and it allows a program to detect and respond to certain "events" as they occur. You can trap Dialog activity, Time passage, Menu Selections, Keyboard activity and Mouse Activity with simple On Gosub statements, and when the specified event occurs, program control is automatically routed to the event handling routine, just like a Basic Gosub. After servicing the event, the sub-routine executes a Return statement and the program resumes execution at the statement where the event occured.

Enhanced Editing Features

Window Master adds an enhanced editor to Basic that allows you to see what you edit. It allows you to insert & delete by character or word, move left or right a word or character at a time, move to begin or end of line, toggle automatic insert on/off or just type over to replace characters. The editor can also recall the last line entered or edited with a single key stroke. You can even change the line number in line to copy it to a new location in the program.

Window Master Features

Multiple Windows

Window Master supports multiple window displays with up to a maximum of 31 windows on the screen. Overlapping windows are supported, and any window can be made active or brought to the top of the screen. Windows can be picked up and moved anywhere on the screen with the mouse. There are 6 different Window styles to choose from and the window text, border and background color is selectable.

Pull Down Menus

Menus are completely programmable with up to 16 menus available. They can be added or deleted at any time in a program. Menu items can be enabled, disabled, checked or cleared easily under program control. Menu selection is automatically handled by Window Master & all you have to do is read a function variable to find out which menu was selected.

Buttons, Icons & Edit Fields

Each Window can have up to 128 buttons, Icons or Edit fields active, if you can fit that many. Buttons, Icons and Edit field selection is handled automatically by Window Master when the mouse is clicked on one. All you have to do is read a Dialog function to find out which Button, Icon, or Edit field was selected, its very simple.

Mouse & Keyboard Functions

Window Master automatically handles the Mouse pointer movement, display and button clicks. It will tell you the current screen coordinate, the local window coordinate, window number the mouse is in, the number of times the button was pressed, which window number it was clicked in and more. The Keyboard is completely buffered, and supports up to 80 programmable Function keys that can contain any kind of information or command sequences you can imagine. You can load and save function key sets at any time. So, you can have special sets of function keys for different tasks. The "Ctrl" key is supported so that you have a full control code keyboard available.

Window Master Applications

Window Master pushes the Color Computer 3 far beyond its normal capabilities, into the world of a "User Friendly" operating enviornment. We are already planning several new programs for use with Window Master. So you don't have to worry about having to write all your own programs. And don't forget that many existing Basic and M.L. programs will run under Window Master with little or no changes. The Possibilities for Application programs are endless: Spread Sheets, Word Processing, Communications, Education, Games, Graphic Design, Desk Top Publishing and on and on.

Hardware Requirements

Window Master requires 512K of memory, at least 1 Disk Drive, a Hi-Res Joystick Interface and a Mouse or Joystick.

Technical Assistance

If you run into difficulty trying to use some of Window Master's features, we will be happy to assist you in any way possible. You can write to us at the address below or call us between 10am and 2pm Pacific Standard Time for a more timely response. Sorry, no collect calls will be accepted.

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pause. Now, if you take out all the `GOSUB` lines and leave lines 262 and 609 masked, it should go even faster.

Next, let's change Line 10 to `SCREEN,1` to add color to the dance. (This looks terrible to me, but beauty is in the eye of the beholder.) Now, if you want to see something odd, change Line 10 to `PMODE3,1`, etc., and run. Try to figure out what is what.

Ready to go nuts? Let's change Line 10 further. Change `PCLS` to `PCLS2` and run the listing.

Something is wrong here. The first thing you will want to do is to change it back. Wrong! The way to tame CoCo is to study mistakes. After all, you made the mistake — not CoCo. Learn from these surprises. Try to figure out what is causing this mistake. You never know what CoCo might reveal to you.

I have barely opened the lid to Pandora's Box. For now, forget about it. As you continue your studies, you will move closer and closer to CoCo's very soul. You will be on the threshold of an interesting learning experience.

I recommend that you keep an open and inquiring mind. Study all mistakes and odd occurrences that you encounter with CoCo. Never dismiss them by pressing `BREAK` or typing `NEW` without trying to determine what they signify. They might be useful to you. Some things you learn might be useless or be filed away for future reference. Some may be incorporated into your expanding storehouse of knowledge. Be curious. Investigate every mistake and try to learn from it.

Modify this program in any way you want. This is a good place for me to leave you. You have achieved a certain degree of animation by using `DRAW` statements. (Do you want to guess what our next tutorial will cover?) □

The listing:

```
0 'LISTING1
10 PMODE4,1:PCLS:SCREEN1,0
20 A$="BR3R2FM+2,6DG3M+1,4DNL4D3
GL2HU4M-2,-6U2M+2,-6EBR7"
30 B$="BR3R2FM+2,6D2M-2,6DNL4D3G
L2HU4M+1,-4H3UM+2,-6E"
40 C$="BR3RFDNL3D2M-1,3M+2,4M-2,
4L2M-2,-5UM+2,-4U4EBR5"
50 D$="BR2RFDNL3D3M+2,4DM-2,5L2M
-2,-4M+2,-4M-1,-3U3E"
100 DRAW"S8C1BM128,96"+A$:PAINT(
136,132),1,1
101 DRAWB$:PAINT(156,132),1,1
102 DRAW"BM130,56"+C$:PAINT(137,
58),1,1
103 DRAWD$:PAINT(150,58),1,1
140 EXEC44539
150 LINE(128,96)-(144,146),PRESE
T,BF
151 LINE(130,56)-(144,96),PRESET
,BF
200 DRAW"C1BM130,16"+C$:PAINT(13
7,18),1,1
201 DRAW"BM128,56"+A$:PAINT(136,
94),1,1
210 EXEC44539
250 LINE(146,56)-(164,92),PRESET
,BF'WL
251 DRAW"C1BM148,16"+D$:PAINT(15
3,18),1,1'WL
260 LINE(148,96)-(164,136),PRESE
T,BF'MR
261 DRAW"C1BM148,56"+B$:PAINT(15
6,92),1,1'MR
262 FOR Q=1TO100:NEXT
300 DRAW"C0BM148,16"+D$:PAINT(15
3,18),0,0'WLOUT
301 DRAW"C1BM188,16"+D$:PAINT(19
3,18),1,1'WLON
310 DRAW"C0BM148,56"+B$:PAINT(15
6,92),0,0'MROUT
320 DRAW"C1BM190,56"+B$:PAINT(19
8,92),1,1'MRON
340 EXEC44539
350 DRAW"C0BM130,16"+C$:PAINT(13
7,18),0,0'WROUT
351 DRAW"C0BM128,56"+A$:PAINT(13
6,92),0,0'MLOUT
400 DRAW"C1BM170,56"+A$:PAINT(17
8,92),1,1'MLON
401 DRAW"BM172,16"+C$:PAINT(179,
18),1,1'WRON
410 EXEC44539
450 DRAW"C0BM190,56"+B$:PAINT(19
8,92),0,0'MROUT
451 DRAW"C1BM190,96"+B$:PAINT(19
8,132),1,1'MRON
460 DRAW"C0BM188,16"+D$:PAINT(19
3,18),0,0'WLOUT
461 DRAW"C1BM188,56"+D$:PAINT(19
3,58),1,1
470 EXEC44539
500 DRAW"C0BM170,56"+A$:PAINT(17
8,92),0,0'MLOUT
501 DRAW"C1BM170,96"+A$:PAINT(17
8,132),1,1'MLON
510 DRAW"C0BM172,16"+C$:PAINT(17
7,18),0,0'MLOUT
511 DRAW"C1BM172,56"+C$:PAINT(17
7,58),1,1
550 DRAW"C0BM170,96"+A$:PAINT(17
8,132),0,0'MLOUT
551 DRAW"C0BM172,56"+C$:PAINT(17
7,58),0,0'WR0UT
600 DRAW"C1BM128,96"+A$:PAINT(13
6,132),1,1'ML0N
601 DRAW"C1BM130,56"+C$:PAINT(13
5,58),1,1'WRON
609 FORQ=1TO100:NEXT
610 EXEC44539
650 DRAW"C0BM190,96"+B$:PAINT(19
8,132),0,0'MROUT
651 DRAW"C0BM188,56"+D$:PAINT(19
5,58),0,0
700 DRAW"C1BM148,96"+B$:PAINT(15
6,132),1,1'MRON
701 DRAW"C1BM148,56"+D$:PAINT(15
5,58),1,1'WLON
750 EXEC44539:GOTO150
1000 GOTO 1000
```

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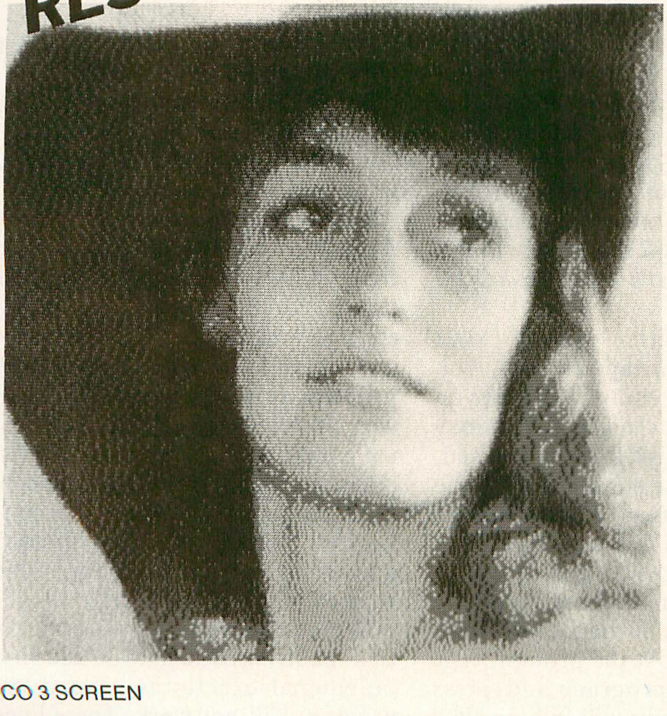

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Get more memory from your CoCo 3 without disconnecting your disk drive

What Disk Drive?

By Jeremy Spiller

After the publication of *Disk Off* for the CoCo 1 and 2 (July '88, Page 118), I received a number of requests for a version compatible with the CoCo 3. Because of these requests, I created *Disk Off 3*, which works essentially the same as my original version.

Disk Off 3 is a machine language program that makes your CoCo 3 think no disk drive is plugged in, even though it is. You may wonder why anyone would want to do such a thing. Even though your machine came with 128K of memory, Disk BASIC can handle a range of only 64K. As soon as you power up with a disk controller in place, Disk BASIC rearranges the available memory and gives itself 2,048 bytes of memory to use for its own housekeeping activities. This 2K of memory is no longer available for the care and feeding of your BASIC program. While most BASIC programs are short enough to run in the machine with the disk drive plugged in, many excellent programs are too long.

So what? Why not just disconnect the disk drive and load the program off tape? Well, if you're like me, once you buy a disk drive, you don't *want* to disconnect it and load off tape. Remember all those IO errors? Remember how *long* it takes to load a long BASIC program? It would be so much easier if you could load your program off disk and then magically rearrange memory to make the missing 2K available to run your program. That's what *Disk Off 3* does.

To use my program, transfer your long program from tape to disk. You may have to type `PCLEAR 1` before you `CLOAD` it. While your long program may not *run* with the disk drive connected, it should fit into the computer with the drive in place. After `CLOAD`ing your program, save it to disk as usual.

Now, enter *Disk Off 3* and save it to disk. When you run *Disk Off 3*, you are asked for the name of the file you want to load from disk. At the prompt, type the name of the program and press ENTER. The disk drive will spin one last time as it loads your BASIC program into memory. When the cursor returns, the computer will think the disk drive is no longer connected. You may list, run or modify the program, and everything should work as if you loaded the program off tape without the disk drive in place.

Note that at this point, if you type a Disk Extended BASIC command like `LOAD` or `SAVE` from the keyboard, you will get a syntax error message. The computer simply doesn't speak Disk BASIC any more.

One very important note: If you use *Disk Off 3* to load from disk a program that includes Disk BASIC commands (`LOAD`, `SAVE`, `MERGE`, `DSKINI`, `COPY` etc.), and then try to list it, the computer will crash. This is not a *Disk Off 3* problem. It involves the way that BASIC was written for the CoCo 3. Now that the computer doesn't speak Disk BASIC anymore, running into a token for a Disk command gives the computer a nervous breakdown. This shouldn't be a problem with any program *written* to be used without a disk drive.

When entering the program, note that the string `D$` in lines 30 and 35 must be entered exactly as printed or the program will not work. These lines do not contain the letter O. If the character looks like 0, then it is a zero. Also, be careful not to confuse the characters F and E. Line 42 contains a checksum. If

---

Jeremy Spiller is a high school student who has been programming his CoCo for over three years. He learned the information needed for this program by disassembling parts of ROM.

you make any errors in typing, *Disk Off 3* tells you, so make sure you enter Line 42 correctly. The best way to double check your code if you get a checksum error is to have a friend read it from the magazine one character at a time while you check each character in your code.

Enjoy your added memory. Use it to create and save longer, more interesting programs on disk for your CoCo 3.

(Questions or comments about the program may be directed to the author at RFD 1, P.O. Box 109, Townsend, MA 01469. Please include an SASE when requesting a reply.) ☐

The listing: `DISKOFF3`

```
1 '*****************************
2 '*  DISKOFF3 (COCO 3 ONLY)    *
3 '*     BY JEREMY SPILLER      *
4 '*           1988             *
5 '*****************************
6 '
10 CLS:CLEAR 1000:PRINT"THIS PRO
GRAM WILL ALLOW YOU TO  LOAD AND
 RUN PROGRAMS OFF YOUR  DISK DRI
VE WHICH NORMALLY CANNOTBE RUN W
ITH THE DISK CONTROLLER PLUGGED
IN. (COCO 3 ONLY!)"
20 PRINT@204,"thinking"
30 D$="810D27761A508EFF98CCCE34A
718E70A7FFFDE8EC000CE40005F8D578
D558D538D51CC0E33FD41A87F41287FF
EED0F717E403F7FC0008E0F00CE80E8C
6518D33CEE2F8C61D8D2CCC0E50FD80B
E7EA0275F9E191F123004A68026FC5D2
603AFA45CA68426F030029F"
35 D$=D$+"1B9F1D9F1F7FFF407EA0E2
A680A7C05A26F939"
40 C=0:FOR X=1 TO LEN(D$)/2:A=VA
L("&H"+MID$(D$,X*2-1,2)):POKE &H
DFF+X,A:C=C+A:NEXT
42 IF C<>14599 THEN PRINT "CHECK
 SUM ERROR, CHECK DATA!":STOP
45 A$="YOU ARE NOW IN EXTENDED B
ASIC   WITH YOUR PROGRAM IN MEMO
RY.":A$=A$+STRING$(113-LEN(A$),3
2):FOR X=1 TO LEN(A$):POKE X+&HE
FF,ASC(MID$(A$,X,1)):NEXT
50 FOR X=1 TO 20:PRINTCHR$(8);:N
EXT:PRINT:INPUT"ENTER PROGRAM NA
ME";A$:POKE 25,30:POKE &H168,&HE
:POKE &H169,0:LOAD A$
```

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This program deals with an alarming problem

Time's Up!

By Steve Blyn
Rainbow Contributing Editor

This month's program presents a working alarm clock. *Alarm Clock* can serve two purposes. First, it can present to the child (or adult) a *real* use for your computer. The program can indeed be used as an alarm clock to remind you to perform some task such as turning off the stove in your kitchen or stopping the silent reading session in the classroom.

Second, and more importantly, it can be used as a math device for reinforcing the skill of telling time. The program asks the student to tell the computer the correct time and to ring the alarm in a certain number of minutes. With the help of a teacher or parent, a child can use this program to learn the computing of alarm time. Questions like "If it is 2:30 now, what time will it be in 20 (or 30 or 45) minutes?" can be worked out.

The hardest question of this kind usually involves going from a time before the hour to a time past the hour. This time concept involves more than just addition and is often the last to be mastered. Questions that use this time element (i.e., If it is now 12:50, what time will it be in 15 minutes?) can determine whether or not the child understands this concept.

Alarm Clock gives students an opportunity to view the passage of time for these math examples on their computer screens. The program also allows students to check their computed answer. The manner in which you use this program is yours to choose.

Lines 40 to 70 ask the user to input the current time in hours and minutes. Error-trapping is included here to prevent incorrect responses. We have found that in this type of program, there are always several adventurous students who will attempt to enter examples such as 30:00 or 2:85. These are more harmless mischief or a desire to test the programmer's abilities than actual errors. It is simple to error-trap for both honest and intentional mistakes.

The user is asked to enter on lines 80 to 90 the time at which the alarm should sound. The program asks for a specific number of minutes from the present time. Although we needed to error-trap this answer also, it was difficult to decide on the time limitations. A student could easily choose to enter 1,000 or 10,000 minutes and probably defeat any normal use of the program. On the other hand, one may want to use this program as an alarm clock for perhaps 480 minutes (8 hours). We settled for time choices ranging from 1 to 200 minutes from the current time. Change the value of Variable `A` in Line 90 to best suit your needs.

The time that the alarm clock should ring is computed on lines 100 to 120. The computer stores this information as Variable `AN`. Lines 130 to 250 draw the clock, and compute and print the correct hours, minutes and seconds. Line 260 plays a second ticker and Line 270 is a minute beeper. These sounds are included to make our clock more realistic and to keep the students' attention on the program. You may adjust your volume control or eliminate these two `PLAY` statements from the program if you want.

The check to determine whether the correct time has been reached is contained on Line 240. When that time arrives, the program branches to the alarm on lines 290 to 320. The alarm will continue until the ENTER key is pressed.

We at Computer Island hope you and your students can make use of this program. We would be grateful to hear of any uses for it that we have not considered. We are always happy to hear from you about your reactions to our programs. See you next month. ☐

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

The listing: `ALARM`

```
10 REM"ALARM CLOCK"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1988"
30 CLS0:PRINT@9,"ALARM  CLOCK";
40 PRINT@64," ":PRINT@64,"TYPE I
N THE HOUR ";:INPUT H
50 IF H<1 OR H>12 THEN 40
60 PRINT@128," ":PRINT@128,"TYPE
 IN THE MINUTES ";:INPUT M
70 IF M<1 OR M>59 THEN 60
80 PRINT@224," ":PRINT@192,"HOW
MANY MINUTES FROM NOW WOULD YOU
LIKE THE ALARM TO RING";:INPUT A
90 IF A<1 OR A>200 THEN 80
100 REM"COMPUTE THE ANSWER"
110 AN=M+A
120 IF M+A>59 THEN AN=M+A-60
130 TIMER=0:REM"DRAW THE CLOCK'S
 BORDER"
140 FOR T=1354 TO 1363:POKE T,17
9:NEXT T
150 FOR T=1418 TO 1427:POKE T,18
8:NEXT T
160 POKE 1386,191:POKE1395,191
170 PRINT@363,"";:B=INT((TIMER/6
0)+.95)
180 PRINT@363,"";
190 IF M>59 THEN M=0:H=H+1
200 IF H>12 THEN H=1:M=0
210 PRINTUSING"##";H;:PRINT":";
220 PRINTUSING"##";M;:PRINT":";
230 PRINTUSING"##";S;
240 IF M=AN THEN 290
250 S=INT(TIMER/60):IF S=60 THEN
 S=0
260 IF S=B THEN PLAY"O3L200C"
270 IF TIMER>3600 THEN TIMER=0:M
=M+1:PLAY"L50G"
280 GOTO 170
290 PLAY"O5L100CEG":PRINT@416,"P
RESS -ENTER- TO TURN OFF ALARM";
300 IN$=INKEY$
310 IF IN$=CHR$(13) THEN END
320 FOR T=1 TO 30:NEXT T:GOTO 29
0
```

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The sixth in a series of tutorials for the beginner to intermediate machine language programmer

Machine Language Made BASIC

Part VI: I Draw the Line

By William P. Nee

This article will discuss and use a routine that executes the BASIC `LINE` command in machine language. The execution of this command will not be faster in machine language than it is in BASIC, since the `LINE` command itself is a machine language routine whether it is called from a BASIC or a machine language program.

The machine language *program*, however, will run more quickly than the BASIC program because all addition and subtraction functions use registers A and B rather than FP1 and FP2. Also, the computer does not have to parse (read each character of) the program to check for a wrong command or a syntax error.

Finding the point where a machine language routine stops reading the BASIC program and actually starts executing the command is one of the major difficulties in implementing `ROM` routines. Sometimes we need to add a small, but necessary, subroutine like the `SCALE` subroutine in last month's article, because we have skipped a portion of the `ROM` routine.

Bill Nee bucked the "snowbird" trend by retiring to Wisconsin from a banking career in Florida. He spends the long, cold winters writing programs for his CoCo.

```
        Subroutine                      Description
$959A  LDB      $B2                     foreground color
TST    $C2                              1 = PSET; 0 = PRESET
BNE    $95A2                            branch if PSET
LDB    $B3                              background color
$95A2  STB      $B4                     color to use
LDA    #$55
MUL                                     to fill one byte
STB    $B5                              color byte
RTS
```

Figure 1

I have included a subroutine at Address $959A that uses the foreground or background colors to either `PSET` or `PRESET`. The subroutine is shown in Figure 1.

The `TST` command checks the CC register to see whether or not a number is equal to zero, and can also check to see if a signed number is positive or negative. You can then branch accordingly.

This routine works because `PRESET` works invisibly, like drawing a red line on a red background: It's there; you just can't see it. This subroutine was not part of the `PSET` routine we used last month, and it is not part of the `LINE` routine used in this article. We must skip the routine because the program looks at BASIC for the proper syntax during the ROM `PSET` and `LINE` routines. Our routine must start after this process.

If you are going to use a lot of color changes and `LINE PRESET`s in your program, you may want to include this subroutine just before the `LINE` routine. However, you may find it easier to enter the proper color number (#$0, #$55, #$AA, or #$FF) into Location $B5 prior to the `LINE` routine. Entering the background color number will `PRESET`; any other color number will `PSET`. See what happens if you put color number other than these in Location $B5.

The BASIC `LINE` command requires an old x_1,y_1 and a new x_2,y_2. In machine language, these coordinates are located at the following locations:

	Location
x_1	$BD/BE
y_1	$BF/C0
x_2	$C3/C4
y_2	$C5/C6

These locations are two bytes long, so your program could use registers X or

Y as well as registers A or B to load the locations.

Again, we must scale these locations or our program will work only in `PMODE 4`. We have already used the routine at $931D to scale x_1,y_1 at $BD and $BF, but to scale x_2 and y_2, we must load Stack U with the actual location of the x_2 coordinate and perform a `JSR $9320`. The entire scaling routine is as follows:

```
JSR $931D          scales x1,y1
LDU #$C3           x2 starts at
                   $C3
JSR $9320          scales x2,y2
```

Normally, this routine should be done just before executing the `LINE` routine at $94A1. Anything necessary in registers A or B must be saved prior to using the scale routine.

The program in this article is in `PMODE 3` and uses all available colors. It draws a line pattern in the following colors and order — cyan, magenta, orange and magenta — on a buff background (Color Set 1). To see Color Set 0, change the '1' in Line 190 to a '0'. Instead of using the subroutine at Address $959A, the program puts the color number directly into Location $B5 (lines 210, 420, 630 and 840). When it has done this, press any key to interrupt execution of the program.

Before entering this program, set Location $FF/100 to #$2000. This moves the *EDTASM+* buffer up to Location $2000, well beyond graphics but below the `ORG` address of the program. If you run the program from BASIC, clear enough memory by using `CLEAR 200, &H3000-1`.

(Questions or comments concerning this tutorial may be directed to the author at Route 2, Box 216 C, Mason, WI 54846-9302. Please enclose an SASE when requesting a reply.) □

Listing 1: `BASLINE`

```
10 PMODE 3,1:PCLS:SCREEN 1,1
20 COLOR 6,5
30 FOR X=0 TO 92 STEP 4
40 LINE(220-X,96-X)-(128-X,4+X),
PSET
50 NEXT
60 COLOR 7,5
70 FOR X=0 TO 92 STEP 4
80 LINE(128-X,4+X)-(36+X,96+X),P
SET
90 NEXT
100 COLOR 8,5
110 FOR X=0 TO 92 STEP 4
120 LINE(36+X,96+X)-(128+X,188-X
),PSET
130 NEXT
140 COLOR 7,5
150 FOR X=0 TO 92 STEP 4
160 LINE(128+X,188-X)-(220-X,96-
X),PSET
170 NEXT
180 GOTO 180
```

Listing 2: `BINLINE`

```
                    00100 *  $FF/100=#$2000
3000                00110         ORG     $3000
3000 C6    03       00120 START   LDB     #3
3002 BD    9628     00130         JSR     $9628
3005 C6    01       00140         LDB     #1       PAGE 1
3007 BD    9653     00150         JSR     $9653
300A BD    9542     00160         JSR     $9542    PCLS
300D C6    01       00170         LDB     #1       GRAPHICS SCREEN
300F BD    95AA     00180         JSR     $95AA
3012 C6    01       00190         LDB     #1       COLOR SET 1
3014 BD    9682     00200         JSR     $9682
3017 C6    55       00210 COLOR1  LDB     #$55     CYAN
3019 D7    B5       00220         STB     $B5
301B 5F             00230 LINE1   CLRB
301C 86    DC       00240 LOOP1   LDA     #220
301E 17    00A7     00250         LBSR    SUBT
3021 97    BE       00260         STA     $BE      X1 LOCATION
3023 86    60       00270         LDA     #96
3025 17    00A0     00280         LBSR    SUBT
3028 97    C0       00290         STA     $C0      Y1 LOCATION
302A 86    80       00300         LDA     #128
302C 17    0099     00310         LBSR    SUBT
302F 97    C4       00320         STA     $C4      X2 LOCATION
3031 86    04       00330         LDA     #4
3033 17    0097     00340         LBSR    ADN
3036 97    C6       00350         STA     $C6      Y2 LOCATION
3038 34    04       00360         PSHS    B
303A 17    0095     00370         LBSR    LINE
```

```
303D 35    04        00380           PULS    B
303F CB    04        00390           ADDB    #4
3041 C1    5C        00400           CMPB    #92       END OF LINE1 YET?
3043 23    D7        00410           BLS     LOOP1
3045 C6    AA        00420 COLOR2    LDB     #$AA      MAGENTA
3047 D7    B5        00430           STB     $B5
3049 5F              00440 LINE2     CLRB
304A 86    80        00450 LOOP2     LDA     #128
304C 8D    7A        00460           BSR     SUBT
304E 97    BE        00470           STA     $BE       X1 LOCATION
3050 86    04        00480           LDA     #4
3052 8D    79        00490           BSR     ADN
3054 97    C0        00500           STA     $C0       Y1 LOCATION
3056 86    24        00510           LDA     #36
3058 8D    73        00520           BSR     ADN
305A 97    C4        00530           STA     $C4       X2 LOCATION
305C 86    60        00540           LDA     #96
305E 8D    6D        00550           BSR     ADN
3060 97    C6        00560           STA     $C6       Y2 LOCATION
3062 34    04        00570           PSHS    B
3064 8D    6C        00580           BSR     LINE
3066 35    04        00590           PULS    B
3068 CB    04        00600           ADDB    #4
306A C1    5C        00610           CMPB    #92       END OF LINE2 YET?
306C 23    DC        00620           BLS     LOOP2
306E C6    FF        00630 COLOR3    LDB     #$FF      ORANGE
3070 D7    B5        00640           STB     $B5
3072 5F              00650 LINE3     CLRB
3073 86    24        00660 LOOP3     LDA     #36
3075 8D    56        00670           BSR     ADN
3077 97    BE        00680           STA     $BE       X1 LOCATION
3079 86    60        00690           LDA     #96
307B 8D    50        00700           BSR     ADN
307D 97    C0        00710           STA     $C0       Y1 LOCATION
307F 86    80        00720           LDA     #128
3081 8D    4A        00730           BSR     ADN
3083 97    C4        00740           STA     $C4       X2 LOCATION
3085 86    BC        00750           LDA     #188
3087 8D    3F        00760           BSR     SUBT
3089 97    C6        00770           STA     $C6       Y2 LOCATION
308B 34    04        00780           PSHS    B
308D 8D    43        00790           BSR     LINE
308F 35    04        00800           PULS    B
3091 CB    04        00810           ADDB    #4
3093 C1    5C        00820           CMPB    #92       END OF LINE3 YET?
3095 23    DC        00830           BLS     LOOP3
3097 C6    AA        00840 COLOR4    LDB     #$AA      MAGENTA
3099 D7    B5        00850           STB     $B5
309B 5F              00860 LINE4     CLRB
309C 86    80        00870 LOOP4     LDA     #128
309E 8D    2D        00880           BSR     ADN
30A0 97    BE        00890           STA     $BE       X1 LOCATION
30A2 86    BC        00900           LDA     #188
30A4 8D    22        00910           BSR     SUBT
30A6 97    C0        00920           STA     $C0       Y1 LOCATION
30A8 86    DC        00930           LDA     #220
30AA 8D    1C        00940           BSR     SUBT
30AC 97    C4        00950           STA     $C4       X2 LOCATION
```

```
30AE 86   60      00960       LDA    #96
30B0 8D   16      00970       BSR    SUBT
30B2 97   C6      00980       STA    $C6     Y2 LOCATION
30B4 34   04      00990       PSHS   B
30B6 8D   1A      01000       BSR    LINE
30B8 35   04      01010       PULS   B
30BA CB   04      01020       ADDB   #4
30BC C1   5C      01030       CMPB   #92     END OF LINE4 YET?
30BE 23   DC      01040       BLS    LOOP4
30C0 BD   ADFB    01050 DONE  JSR    $ADFB   WAIT FOR INPUT
30C3 5F           01060       CLRB           TEXT SCREEN
30C4 BD   95AA    01070       JSR    $95AA
30C7 3F           01080       SWI            RTS IF IN BASIC
30C8 34   04      01090 SUBT  PSHS   B
30CA A0   E0      01100       SUBA   ,S+
30CC 39           01110       RTS
30CD 34   04      01120 ADN   PSHS   B
30CF AB   E0      01130       ADDA   ,S+
30D1 39           01140       RTS
30D2 BD   931D    01150 LINE  JSR    $931D   SCALE X1 AND Y1
30D5 CE   00C3    01160       LDU    #$C3    START OF X2
30D8 BD   9320    01170       JSR    $9320   SCALE X2 AND Y2
30DB BD   94A1    01180       JSR    $94A1   DRAW THE LINE(X1,Y1)-(X2,Y2)
30DE 39           01190       RTS
          3000    01200       END    START

00000 TOTAL ERRORS
```

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Save your computer screen's life

Save That Screen!

By Paul E. Jones

Perhaps you've seen an arcade game that had a game screen image "burned" into it. Have you ever seen a television or monitor with that problem? Although this doesn't happen often, any picture left on a screen for a long period of time can damage that screen — even your Coco screen.

Because of this danger, I wrote an assembly language utility that clears your CoCo screen and changes the screen color to black if you do not press a key for several minutes. This could save your monitor's life if you often leave your CoCo on without using it. The program, *Screen Saver*, was written with *EDTASM+* and requires a CoCo 3. It was written to remain in the upper programming area, but you may reassemble and place this utility in another location. *Screen Saver* uses the `IRQ` interrupt and resides in the BASIC program/variable area. It will not operate with some programs that either take over the `IRQ` or use the same memory space.

Screen Saver is easy to use. Before loading the program, type `CLEAR 200, &H7EFF` to clear that location for your program. Then type the following:

```
(C)LOADM"SCRNSAVE":EXEC
```

to execute the program. You will see a message on the screen telling you that the program has been installed. Now, if no key is pressed within approximately two minutes, the screen will go black.

Don't worry if you have a BASIC program running. *Screen Saver* does not stop the execution of a program; it just turns off the video. When you want to see the screen again, press any key. Your screen will return, and you may continue programming.

Use this utility to save the life of your monitor. Trust me, your monitor will thank you.

(Questions or comments concerning this utility may be addressed to the author at 205 Baldwin Ave., Princeton, KY 42445. Please enclose an SASE when requesting a reply.) ☐

Paul Jones, a college student majoring in mathematics, has been a CoCo fan for five years.

The listing: SCRNSAVE

```
                        00100 * Screen Saver 1.1
                        00110 * Copyright (C) 1988
                        00120 * By Paul E. Jones
                        00130 * System: Color Computer 3
                        00140 *
                        00150 * Compiled with EDTASM+
                        00160 *
7F00                    00170        ORG     $7F00
7F00 1A    50           00180 START  ORCC    #$50       Disable Interupts
7F02 34    16           00190        PSHS    X,D        Link to IRQ
7F04 BE    010D         00200        LDX     $10D
7F07 BF    7F22         00210        STX     RETAD
7F0A 8E    7F59         00220        LDX     #INT
7F0D BF    010D         00230        STX     $10D
7F10 8E    7F24         00240        LDX     #MES       Display Message
7F13 A6    80           00250 LOOP1  LDA     ,X+
7F15 27    06           00260        BEQ     EXIT1
7F17 AD    9F A002      00270        JSR     [$A002]
7F1B 20    F6           00280        BRA     LOOP1
7F1D 35    16           00290 EXIT1  PULS    D,X
7F1F 1C    AF           00300        ANDCC   #$AF
7F21 39                 00310        RTS                Link made- return
7F22       0000         00320 RETAD  FDB     0000       Store IRQ return address
7F24       53           00330 MES    FCC     "Screen Saver 1.1"
           63
           72
           65
           65
```

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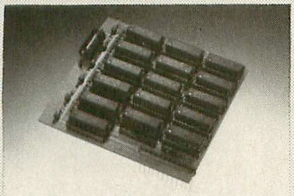

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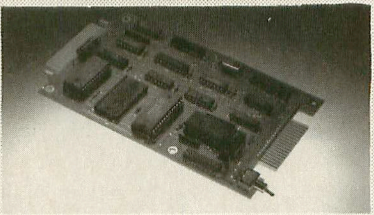

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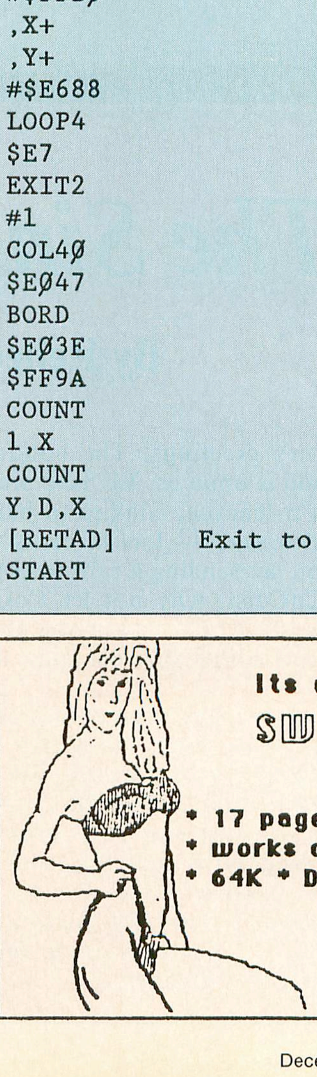
```
            6E
            20
            53
            61
            76
            65
            72
            20
            31
            2E
            31
 7F34       0D        00340           FCB      13
 7F35       43        00350           FCC      "Copyright (C) 1988"
            6F
            70
            79
            72
            69
            67
            68
            74
            20
            28
            43
            29
            20
            31
            39
            38
            38
 7F47       0D        00360           FCB      13
 7F48       50        00370           FCC      "Paul E. Jones"
            61
            75
            6C
            20
            45
            2E
            20
            4A
            6F
            6E
            65
            73
 7F55       0D        00380           FCB      13
 7F56       00        00390           FCB      0
 7F57       0000      00400 COUNT     FDB      0000        Time of last key press
 7F59 34    36        00410 INT       PSHS     X,D,Y       IRQ interupt
 7F5B BE    0152      00420           LDX      $152        Are Any keys pressed?
 7F5E 8C    FFFF      00430           CMPX     #$FFFF
 7F61 26    4F        00440           BNE      RESET       If so, reset colors
 7F63 BE    0154      00450           LDX      $154
 7F66 8C    FFFF      00460           CMPX     #$FFFF
 7F69 26    47        00470           BNE      RESET
 7F6B BE    0156      00480           LDX      $156
 7F6E 8C    FFFF      00490           CMPX     #$FFFF
 7F71 26    3F        00500           BNE      RESET
 7F73 BE    0158      00510           LDX      $158
 7F76 8C    FFFF      00520           CMPX     #$FFFF
```

```
7F79 26   37      00530           BNE    RESET
7F7B BE   7F57    00540           LDX    COUNT       If not, increase counter
7F7E 30   01      00550           LEAX   1,X
7F80 8C   1FFF    00560           CMPX   #$1FFF      Key pressed in a long time?
7F83 26   5B      00570           BNE    EXIT2       If so, exit
7F85 B6   7F24    00580 SAVE      LDA    MES         Save all Colors
7F88 27   10      00590           BEQ    BLACK
7F8A 8E   FFB0    00600           LDX    #$FFB0
7F8D 108E E678    00610           LDY    #$E678
7F91 A6   80      00620 LOOP2     LDA    ,X+
7F93 A7   A0      00630           STA    ,Y+
7F95 8C   FFC0    00640           CMPX   #$FFC0
7F98 26   F7      00650           BNE    LOOP2
7F9A 8E   FFB0    00660 BLACK     LDX    #$FFB0      Turn screen black
7F9D 86   00      00670           LDA    #0
7F9F B7   FF9A    00680           STA    $FF9A
7FA2 A7   80      00690 LOOP3     STA    ,X+
7FA4 8C   FFC0    00700           CMPX   #$FFC0
7FA7 26   F9      00710           BNE    LOOP3
7FA9 7F   7F24    00720           CLR    MES
7FAC 35   36      00730           PULS   Y,D,X
7FAE 6E   9F 7F22 00740           JMP    [RETAD]     Exit to BASIC
7FB2 8E   0000    00750 RESET     LDX    #0          Replace all Colors
7FB5 BF   7F57    00760           STX    COUNT
7FB8 86   01      00770           LDA    #1
7FBA B7   7F24    00780           STA    MES
7FBD 8E   E678    00790           LDX    #$E678
7FC0 108E FFB0    00800           LDY    #$FFB0
7FC4 A6   80      00810 LOOP4     LDA    ,X+
7FC6 A7   A0      00820           STA    ,Y+
7FC8 8C   E688    00830           CMPX   #$E688
7FCB 26   F7      00840           BNE    LOOP4
7FCD 96   E7      00850           LDA    $E7
7FCF 27   0F      00860           BEQ    EXIT2
7FD1 81   01      00870           CMPA   #1
7FD3 27   05      00880           BEQ    COL40
7FD5 B6   E047    00890 COL80     LDA    $E047
7FD8 20   03      00900           BRA    BORD
7FDA B6   E03E    00910 COL40     LDA    $E03E
7FDD B7   FF9A    00920 BORD      STA    $FF9A
7FE0 BE   7F57    00930 EXIT2     LDX    COUNT
7FE3 30   01      00940           LEAX   1,X
7FE5 BF   7F57    00950           STX    COUNT
7FE8 35   36      00960           PULS   Y,D,X
7FEA 6E   9F 7F22 00970 ZZ        JMP    [RETAD]     Exit to BASIC
          7F00    00980           END    START
00000 TOTAL ERRORS
```

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

1A) Title of publication: The Rainbow, The Color Computer Monthly Magazine. B) Publication No.: 705050. 2) Date of filing: September 12, 1988. 3) Frequency of issue: Monthly. 3A) No. of issues published annually: 12. 3B) Annual subscription price: $31.00. 4) Complete Mailing Address of known office of publication: The Falsoft Building, 9509 U.S. Highway 42, Prospect, Jefferson County, Kentucky 40059. 5) Complete Mailing Address of headquarters of general business offices of the publisher: Same. 6) Names and complete addresses of publisher, editor, and managing editor: Publisher and Editor: Lawrence C. Falk, The Falsoft Building, 9509 U.S. Highway 42, Prospect, Kentucky 40059; Managing Editor: Jutta Kapfhammer, The Falsoft Building, 9509 U.S. Highway 42, Prospect, Kentucky 40059. 7) Owner: Falsoft, Inc., The Falsoft Building, 9509 U.S. Highway 42, Prospect, Kentucky 40059. 8) Known bondholders, mortgagees and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None. 9) For completion by nonprofit organizations authorized to mail at special rates (Section 423.12 DMM). The purpose, function and nonprofit status of this organization and the exempt status for Federal Income tax purposes (Check one): Not applicable. 10) Extent and nature of circulation: (X)=Average No. copies each issue during preceding 12 months; (Y)=Actual No. copies of single issue published nearest to filing date. A) Total No. of copies printed: (X)64,200 (Y)59,750. B) Paid circulation: 1) Sales through dealers and carriers, street vendors and counter sales: (X)24,079 (Y)31,490. 2) Mail subscription: (X)25,410 (Y)25,109. C) Total paid circulation: (X)50,489 (Y)56,579. D) Free distribution by mail, carrier or other means, samples, complimentary and other free copies: (X)2,647 (Y)2,551. E) Total distribution: (X)53,136 (Y)59,130. F) Copies not distributed: 1) Office use, left over, unaccounted, spoiled after printing: (X)230 (Y)580. 2) Returns from news agents: (X)10,834 (Y)40. G) Total: (X)64,200 (Y)59,750.



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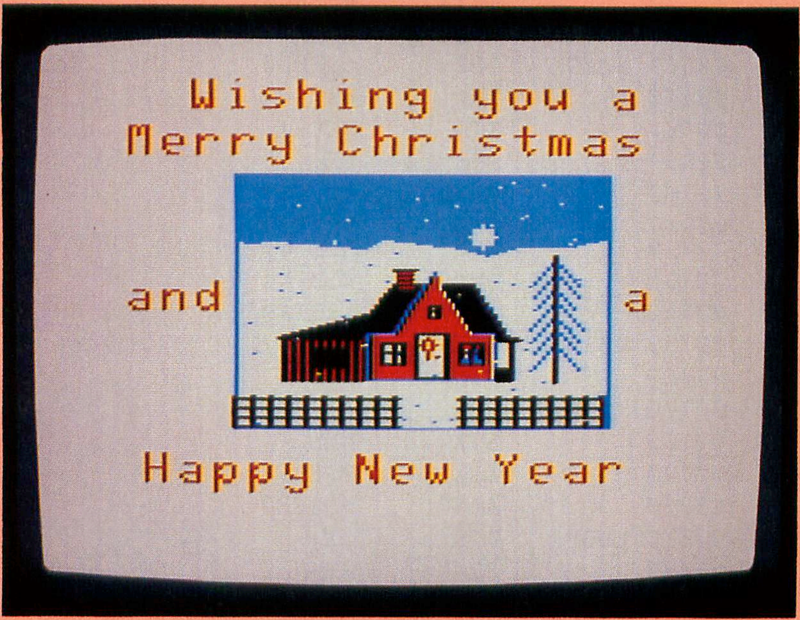

Wishing you a
Merry Christmas
and a
Happy New Year

The Singing Card

By Rebecca Kastack

Season's greetings! The holiday season is upon us. We have presents to choose, cookies to bake and cards to send — lots of cards to send. If you are sending a card to your favorite CoCoist, why not let CoCo lend a hand? CoCo can make this holiday ritual a little different and a lot more fun.

Instead of the usual holiday card you find in any drug store, use CoCo to create the perfect holiday card. Then, once the scene is set, add a little Christmas music to make your card special. Once the program is complete, save it to tape or disk to send out to your favorite Color Computer user.

My program, *Singing Card*, uses 16K of memory and presents a Christmas card scene complete with a country house and falling snow. While you view this scene, CoCo plays the song "Have Yourself a Merry Little Christmas." This card will delight friends and relatives. It offers season's greetings to your loved ones and lets you make that greeting as unique and special as all CoCo users are.

(Questions or comments about the program may be directed to the author at P.O. Box 47, South Lancaster, ON, Canada K0C 2C0. Please enclose an SASE when requesting a reply.) ☐

Rebecca Kastack is an 11th grade student in Ontario. Her interests include art, science and computers.

130 61
200 67
290 3
440 94
650 127
880 126
END 180

The listing: SINGCARD

```
10 '******************************
20 'CHRISTMAS CARD BY REBECCA
30 '                  KASTACK
40 '******************************
50 DIM C$(122):P$="T4"
60 DATA BD6BR1R1U1L1D1,
70 DATA BR1R2F1D4G1L2H1NE4U4E1
80 DATA BR2NG1D6R1L2, BD1E1R2F1D
1G1L2G1D2R4, BD1E1R2F1D1G1L1R1F1
D1G1L2H1, BR3D6U6G3D1R4, NR4D2R3
F1D2G1L2H1, BR3L1G2D3F1R2E1U1H1L
3, R4D1G4D1, BD1D1F1G1D1F1R2E1U1
H1NL2E1U1H1L2G1
90 DATA BD6BR1R1E2U3H1L2G1D1F1R3
100 DATA ,,,,,,
110 DATA BD2D4U2R4D2U4H2G2, R3F1
D1G1F1D1G1L3R1U3NR2U3, BR1R2F1BD
4G1L2H1U4E1, R3F1D4G1L3R1U6, R4L
4D3R2L2D3R4, R4L4D3R2L2D3, BD1BR
4H1L2G1D4F1R2E1U2L1, D6U3R4U3D6,
 BR1R2L1D6R1L2
120 DATA BD4D1F1R2E1U5, D6U3R1NE
3F3, D6R4, ND6R1F1D1U1E1R1D6, ND
6F1D1F2D1F1U6, BR1R2F1D4G1L2H1U4
E1, D6U3R3E1U1H1L3, BR1R2F1D3G1F
1H2F1G1L1H1U4E1, R3F1D1G1L3R1NF3
L1D3U6
130 DATA BR4BD1H1L2G1D1F1R2F1D1G
1L2H1, R4L2D6, D5F1R2E1U5, D2F1D
1F1D1U1E1U1E1U2, D6R1E1U1D1F1R1U
6, D1F2E2U1D1G4D1U1E2F2D1, D1F2N
D3E2U1, R4D1G4D1R4
140 DATA ,,,,,
150 DATA BD2BR1R2F1D3L3H1E1R3, D
6U1R1F1R1E1U2H1L1G2, BD3D2F1R2E1
BU2H1L2G1, BR4D6U1L1G1L1H1U2E1R1
F2, BD4R4U1H1L2G1D2F1R2, BD3BR1R
2L1D3U5E1F1, BD2BR4D2H2L1G1D1F1R
3U1D3G1L2H1
160 DATA D6U2E2R1F1D3, BR2D0BD2L
1R1D4R1L2, BR4BD1D0BD2D4G1L2H1,
D6U2R1NE2F2, BR1R1D6R1L2, BD2D4U
4R1F1ND3E1F1D3, BD2D4U2E2R1F1D3,
 BD3D2F1R2E1U2H1L2G1, BD2D6U4F2R
1E1U2H1L1G2
170 DATA BR4BD2D2H2L1G1D2F1R1E2D
4, BD2D4U2E2R1F1, BR4BD2L3G1F1R2
F1G1L3, BR2D2R2L4R2D3F1E1, BD2D3
F1R1E2U2D4, BD2D2F2E2U2, BD2D3F1
E1NU1F1E1U3, BD2F4H2E2G4, BD2D2F
1R3U3D5G1L2H1
180 DATA BD2R4G4R4
190 'MUSIC
200 DATA O3,L4,C,E,G,O+,C,O-,L8,
G,F,E,D,L4,C,D,C,E,G,O+,C,O-,L2.
,G,P4,L4,E,G,O+,C,E,L8,D,C,O-,B,
A,L4,G,F,L2,E,L4,B-,A,L2,A,L4,A-
,G,C,E,G,O+,C,O-,L8,G,F,E,D,L4,C
,D,C,E,G,O+,C,O-,L2.,G,P4,L4,E,G
,O+,C,E,L8,D,C,O-,B,A,L4,G#,B,L2
,O+,C,O-,L4,E,A
210 DATA B,O+,D,L2,C,L4,E,P100,E
,P100,E,L8,D,C,O-,B,O+,C,L4,D,P4
,L8,C,O-,B,A,B,O+,L2,C,O-,L4,B,L
2.,B,P4,O+,L4,C,P100,C,P100,C,O-
,L8,B,A,G,A,L4,B,P4,L8,G,A,B,O+,
C,L2,D,O-,L4,D,L1,G,L4,C,E,G,O+,
C,O-,L8,G,F,E,D,L4,C,D,C,E,G,O+,
C,O-,L2.,G,P4
220 DATA L4,E,G,O+,C,E,L8,F,E,D,
C,O-,L4,B,O+,D,L1,EL2E,P4,L4,E,P
100,E,O-,F,A,O+,C,L8,E,D,C,O-,B,
L4,A,B,O+,L1,CL2.C,P4
230 DATA ZZ
240 FORA=46TO122:READC$(A):NEXTA
250 PMODE 3,1:PCLS(6):SCREEN1,1:
POKE 65314,248
260 S=8:A$="PRESS ENTER IF":H=10
:V=10:GOSUB1000:A$="SCREEN IS RE
D.":H=10:V=30:GOSUB1000:A$="PRES
```

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```
S ANY OTHER":H=10:V=50:GOSUB1000
:A$="KEY IF SCREEN":H=10:V=70:GO
SUB1000:A$="IS BLUE.":H=10:V=90:
GOSUB1000
270 EXEC 44539:IF ASC(INKEY$)<>1
3 THEN BL=6:RE=7 ELSE BL=7:RE=6
280 PMODE 3,1:PCLS(8):SCREEN 1,1
:POKE 65314,248
290 COLOR 5,8
300 LINE(68,110)-(111,99),PSET:L
INE-(120,87),PSET:LINE-(156,87),
PSET:LINE-(172,110),PSET:LINE-(6
8,110),PSET
310 LINE(168,108)-(178,111),PSET
:LINE-(168,111),PSET:LINE-(168,1
08),PSET:LINE(175,111)-(175,128)
,PSET:LINE-(168,128),PSET:LINE-(
168,123),PSET:LINE-(175,123),PSE
T
320 PAINT(140,100),5,5
330 PAINT(170,110),5,5:PAINT(173
,126),5,5
340 COLOR BL,8
350 LINE(48,41)-(218,149),PSET,B
360 LINE(109,128)-(109,108),PSET
:LINE-(120,108),PSET:LINE-(138,8
2),PSET:LINE-(156,108),PSET:LINE
-(167,108),PSET:LINE-(167,128),P
SET:LINE-(109,128),PSET
370 PAINT(140,105),RE,BL
380 PSET(140,85,RE):PSET(140,86,
RE):PSET(140,84,RE)
390 FOR A=71 TO 108 STEP 2
400 IF CO=5 THEN CO=RE ELSE CO=5
410 COLOR CO,8
420 LINE(A,111)-(A,128),PSET
430 NEXTA
440 LINE(83,114)-(97,122),PSET,B
F
450 LINE(121,81)-(131,81),PSET
460 FOR A=82 TO 89
470 IF CO=RE THEN CO=5 ELSE CO=R
E
480 COLOR CO,8
490 LINE(123,A)-(129,A),PSET
500 NEXTA
510 LINE(131,108)-(145,127),PSET
,B
520 PAINT(138,120),8,5
530 LINE(114,112)-(124,121),PSET
,B
540 PAINT(120,115),8,5
550 LINE(151,112)-(161,121),PSET
,B
560 PAINT(156,115),RE,5
570 COLOR BL,8
580 LINE(152,120)-(156,113),PSET
:LINE-(160,120),PSET:LINE-(152,1
20),PSET
590 PAINT(156,118),BL,BL
600 COLOR 5,8
610 LINE(156,112)-(156,121),PSET
620 LINE(120,112)-(120,121),PSET
630 LINE(151,116)-(161,116),PSET
640 LINE(114,116)-(124,116),PSET
650 LINE(136,96)-(140,101),PSET,
B
660 PAINT(138,98),8,5
670 LINE(136,98)-(140,98),PSET
680 COLOR RE,8
690 CIRCLE(137,113),4
700 LINE(137,116)-(137,119),PSET
710 PSET(140,118,5)
720 COLOR BL,8
730 LINE(49,69)-(55,70),PSET:LIN
E-(64,69),PSET:LINE-(106,72),PSE
T:LINE-(114,68),PSET:LINE-(152,7
2),PSET:LINE-(162,75),PSET:LINE-
(178,71),PSET:LINE-(199,71),PSET
:LINE-(217,68),PSET
740 PAINT(130,50)
750 CIRCLE(161,67),7,5,.87
760 PAINT(161,67),8,5
770 CIRCLE(161,67),7,8,.87
780 DRAW"S4"
790 FOR A=77 TO 114 STEP 6
800 B=8+RND(5)
810 D$="BM194,"+STR$(A)+"NG"+STR
$(B)+"F"+STR$(B)
820 DRAW D$
830 NEXTA
840 COLOR 5,8
850 LINE(194,75)-(194,129),PSET
860 FOR A=136 TO 148 STEP 4
870 LINE(49,A)-(217,A),PSET
880 NEXT
890 FOR A=49 TO 217 STEP 8
900 LINE(A,135)-(A,148),PSET
910 NEXT
920 LINE(125,134)-(148,148),PRES
ET,BF
930 DRAW"C"+STR$(RE):A$="Wishing
 you a":V=0:H=30:GOSUB1000:A$="M
erry Christmas":V=20:H=0:GOSUB10
00:A$="and":V=86:H=0:GOSUB1000:A
$="a":V=86:H=228:GOSUB1000:A$="H
appy New Year":V=160:H=8:GOSUB10
00
940 Y=RND(106)+41:X=RND(167)+49
950 IF PPOINT(X,Y)=8 THEN CL=BL
ELSE CL=8
960 PSET(X,Y,CL)
970 IF P$="ZZ" THEN 940
980 PLAY P$:READ P$
990 GOTO 940
1000 H1=8*(S/4):DRAW"S"+STR$(S):
L=LEN(A$):FORA=1 TO L:M=ASC(MID$
(A$,A,1))
1010 D$="BM"+STR$(H)+","+STR$(V)
+C$(M):DRAW D$
1020 H=H+H1:NEXTA
1030 RETURN
```

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1 9 17 25 33 41 49 57 65 73
2 10 18 26 34 42 50 58 66 74
3 11 19 27 35 43 51 59 67 75
4 12 20 28 36 44 52 60 68 76
5 13 21 29 37 45 53 61 69
6 14 22 30 38 46 54 62 70
7 15 23 31 39 47 55 63 71
8 16 24 32 40 48 56 64 72

PLEASE CIRCLE
TAPE OR DISK

Get rid of slow graphics scrolls, and put these faster routines to work

All the Right Moves

By Barry J. Mitchel

When scrolling a full graphics screen on a CoCo 1 or 2, you don't need assembly language to surpass GET and PUT. In this article, I will discuss three scrolling methods that use BASIC. I will also present two programs. The first will allow you to compare the methods and determine the best one for your needs. The second keeps only the fastest method for each direction; use it as a subroutine with your own graphics creations.

The Programs

Table 1 outlines the organization of the first program, *Scroll Demo*. This program uses its own character font to draw a diagram and an accompanying text. It saves the screens and then presents a menu of demonstration scrolling methods. *Fast Scroll*, outlined in Table 2, reloads the screens from tape or disk and then uses the fastest scrolling method for the desired direction. You can substitute any picture that you have saved for the screens produced by *Scroll Demo*.

Either program reserves 10 graphics pages, which are divided into five `PMODE 1` screens. Three of these screens are explanatory text, one is a diagram (reproduced in Figure 1) and the fifth is a mobile window of the other four screens. Pages one to eight are written while displayed in `PMODE 3` to show that the 2-by-2 grid of the `PMODE 1` screens is equivalent to two `PMODE 3` screens, side by side.

If you run *Scroll Demo*, choose a scrolling method from the menu. Now, for either program, press any key to see the window in the upper-left `PMODE 1,1` screen. From this position, you can move the window either one row down or one column right. If you press the down arrow, the first row is removed from the screen. The other 15 rows all move up one row, and the bottom row is replaced by a copy of the top row of the `PMODE 1,3` screen. If you press the right arrow, 31 (of 32) columns are moved left, and the right column is replaced by a copy of the far-left column of the `PMODE 1,5` screen.

By pressing SHIFT and an arrow key, you can repeat the same move until you reach the opposite border. Then an elapsed time is shown briefly on the text screen. Pressing ENTER moves the screen up and to the left edge; pressing CLEAR moves the screen to the bottom right corner; and pressing SHIFT and CLEAR moves the screen to the top right corner. Pressing any key other than these window-movers will bring up the menu.

When the window moves anywhere other than along a border, the vacated row or column is replaced by pieces from two neighboring screens. The size of each piece is related to the dimensions L, R, U and D. (See Figure 1.) These single-row or single-column replacements are always formed by GET and PUT. However, the bulk of the screen window can be moved faster — using less memory — by other methods. In this article, we will look at four of these methods.

The GET-and-PUT Method

Together, GET and PUT move any or all rectangular parts of a screen, using

Lines	Purpose(s)
20	Reserves eight graphics pages; reads text font; begins loop to display graphics text
21	Moves display pointer to start of text row; prints all capital letters and @
22-24	Print a blank, comma or period
25	Advances pointer to next text cell; ends loop
26	Draws diagram of graphics page layout (Figure 1)
27	Option to save screens; if no, skip to Line 49
28	Saves screens, then jumps over `DATA` to Line 48
29-31	Text `DRAW` fonts for @ through G, H through Q and R through Z
32-36	Text of `PMODE 1,1` (upper left) screen
37-41	Text of `PMODE 1,3` (lower left) screen
42-46	Text of `PMODE 1,7` (lower right) screen
47-48	Text of `PMODE 1,5` (upper right) screen
48	Sets program-start pointer to end of `DATA` + 2
49	Reserves 10 graphics pages, and, optionally, deletes Line 48
50-51	Set up string pool and stack; offer method menu
52-53	Initialize variables and arrays; poke pointers
54	Initializes window to upper left quadrant
55	Displays lapsed time of sweep move for 1.2 seconds
56	Senses control keys, or returns to method menu
57-65	Move window in response to up arrow
66-75	Move window in response to down arrow
76-84	Move window in response to right arrow
85-93	Move window in response to left arrow
94	Method 3 subroutine using spare graphics page
95-96	Method 4 subroutines to restore pointers
97	Moves window to lower left quadrant, using the CLEAR key
98	Moves window to upper right quadrant, using the SHIFT-CLEAR keys
99	Moves window to left border and down, using the ENTER key

Table 1: Road Map to *Scroll Demo*

Barry Mitchel is a structural/mechanical engineer, who also plays in a handbell choir and foresees a day when cumbersome sheet music is replaced by video monitors that are controlled by the director.

Line(s)	Purpose(s)
20	Reserves eight graphics pages, and reads pages from disk
49	Reserves 10 graphics pages, and sets window display
50-99	See Table 1; only fastest method for each direction is used

Table 2: Road Map to *Fast Scroll*

the numeric array `P` as a buffer. The buffer size must be *at least* the number of bytes that map into the moved graphics rectangle. Since a `PMODE 1` screen contains 3,072 bytes and each array element has five bytes, an array dimension equal to 614 (3,075 divided by five, minus one) is enough.

The MID$= Method

The fifth `PMODE 1` screen (the window) is mapped into 16 strings in Array `P$` by poking the pointer bytes of each array element in Line 52. The `MID$=` command does not change these pointers; it changes the content of the string — provided that the string is in the pool. Therefore, `POKE 33` in the program sets the bottom of the pool pointer below the graphics pages during these moves. In order to study the movement, you can freeze the move process at any point by pressing SHIFT-@.

The VAR$= Method

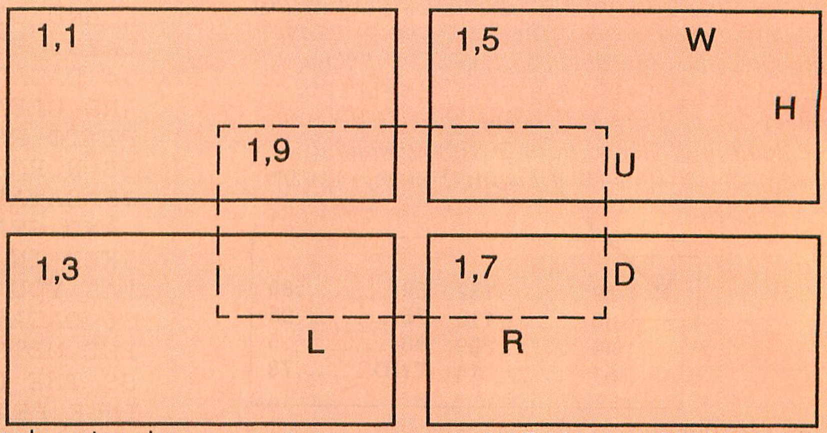
The `VAR$=` method is a variation of `MID$=`. All others use a scratch area in free memory as a temporary string pool. This was chosen to match the location of graphics pages 17 and 18, so that two `PCOPY`s (Line 94) can return the result back to the window.

The PCLEAR Method

The `PCLEAR` method pretends that the graphics window is the program and moves it in a single step, using no arrays, string pools or scratch area. Most of the coding sets up and dismantles this pretext. After each `PCLEAR`, variables, arrays and program start are recovered in lines 95 and 96.

Time Trials of the Four Methods

Table 3 compares average timer methods for 32 scroll steps (i.e., one full horizontal sweep or two vertical sweeps along a border). The times may increase by 0.8 to 1 second for interior sweeps because small pieces of two adjacent screens are copied by `GET` and `PUT`. After verifying Table 3 yourself, replace Line 55 with a `REM`.



Each rectangle represents two pages or 3K RAM, with PMODE shown at upper left. Window is dashed. The six position variables (L,R,U,D,W,H) are also shown.

Figure 1: Schematic Diagram of Graphics Pages

Method		Shifted Arrow Key			
No.	Name	Up	Down	Left	Right
1	`GET-and-PUT`	16.76	16.6	16.77	16.71
2	`MID$=`	10.02	9.88	12.66	12.60
3	`VAR$=`	*7.55	10.05	9.54	*9.63
4	`PCLEAR`	7.74	*7.34	*7.26	17.50

***Denotes method used in *Fast Scroll* for each direction.**

Times for Methods When used in *Fast Scroll*:

Up	Down	Left	Right
6.81	7.05	6.96	8.52

Table 3: Times for 32 Scrolls by Each Method

The benchmark method, `GET`-and-`PUT`, takes 16.7 seconds in any scroll direction. The second method, `MID$=`, requires 10 seconds for up and down movement, but it is slower for right and left movement because of the second `MID$=`. The third method, `VAR$=`, takes 10 seconds to move in the three directions that require an extra `PCOPY`; however, it takes less than eight seconds when moving up. Finally, the fourth method, `PCLEAR`, takes seven to eight seconds for all moves except those to the right, which (because of additional movement) take twice as long.

Fast Scroll condenses the scrolling routine in *Scroll Demo* (lines 56 to 96) and uses only the fastest method in each direction (i.e., Method 3 for up and right, Method 4 for down and left). Removal of the code for alternative methods improves execution times. (See Table 3.) If we compare the execution of these methods in *Fast Scroll* to the execution of `GET`-and-`PUT` in *Scroll Demo*, we see that *Fast Scroll* is two to two-and-a-half times faster.

Applications and Improvements

These scrolling methods can be adapted readily to joystick or mouse control, and to any graphics screen you create. When using a joystick or a mouse, you can add diagonal scrolls to your options. Method 3 seems to be the easiest routine to generalize for any scrolling direction.

Finally, the size of the spreadsheet or scene across which the window scrolls is not limited to the two-by-two screen shown in Figure 1. With a disk drive and the `PCOPY` command, the contents of pages 1 to 8 can be updated each time the window reaches a border, so new territory to explore appears continually.

Those of you interested in using the routines described here should contact me for technical information about methods 2 through 4, which are fraught with perils and pitfalls.

(Questions or comments concerning these programs may be directed to the author at 70 Longview Rd., Reading, MA 01867. Please include an SASE when requesting a reply.) □

Editor's Note: In order to run these programs on a cassette-based system, the following programming lines must be edited: In Line 27 of Listing 1, change the `DISK IN DRIVE 0` *to* `TAPE IN RECORDER`*; In Line 28 of Listing 1, delete the* `VERIFY ON:` *command and change both* `SAVEM` *commands to* `CSAVEM`*; and in Line 20 of Listing 2, change* `LOADM` *to* `CLOADM`.

29	132	60	80
36	110	75	95
44	209	88	5
51	14	END	79

Listing 1: `SCRLDEMO`

```
0 'ALL THE RIGHT MOVES'LISTING 1
 - BARRY J. MITCHEL - JUNE 1988
20 PMODE3:PCLEAR8:SCREEN1,1:PCLS
:DIMC$(26):FORL=0TO26:READC$(L):
NEXT:FORL=0TO53:READP$,L$:IFL=30
THENEXEC42961:PMODE3,5:SCREEN1,0
:PCLS
21 DRAW"BM"+P$:FORP=1TOLEN(L$):C
=ASC(MID$(L$,P)):IFC>63ANDC<91TH
ENDRAWC$(C-64):GOTO25
22 IFC=32THENDRAW"BR4
23 IFC=44THENDRAW"RNEBR3
24 IFC=46THENDRAW"BR2U0BR2
25 DRAW"BR4":NEXTP,L
26 B$="R96D36L96U36BF4D6BR6NGBR4
":DRAW"BM30,12C3XB$;U6BR84C4U4XB
$;R6U3L6U3R6BD32C3L20XB$;E6L6BL9
8C4R6D3NL4D3L6BH10L4XB$;BE36BD8C
2XB$;R6U6L6D3R4
27 EXEC:CLS1:PRINT"DO YOU WANT T
O SAVE THE SCREENS FOR QUICK REC
OVERY NEXT TIME ?  PRESS N TO BY
PASS SAVE, OR ELSE PUT DISK IN D
RIVE 0 AND PRESS Y":EXEC44539:IF
INKEY$<>"Y"THEN49
28 VERIFYON:B=PEEK(188)*256:E=B+
6143:SAVEM"PAGES1-4",B,E,B:B=E+1
:E=B+6143:SAVEM"PAGES5-8",B,E,B
29 DATABLBU3ER3FD2GL2HLRERFBF,U2
E2F2NL3D2,U4R3FGNL2FGL2BR3,U4R4B
G4R4,U4R3FD2GL2BR3,U4R4BG2L2D2R4
,U4R4BG2NLBF2,U4R4BD2D2NL3
30 DATAU4D2R4U2D4,BR2NU4BR2,NUR4
NU4,U4BR4G2F2,NU4R4,U4FR2ED4,U4F
4NU4,HU2ER3FD2GL2BR3,U4R4D2L3RBF
2,HU2ER3FD3L3REF
31 DATAU4R4D2L3RDRF,R4U2L4U2R4BD
4,BE4L4R2D4BR2,NU4R4NU4,BU4D2F2E
2U2BD4,NU4ER2FNU4,E4BL4F4,BR2U2H
LUBF2REUBD4,BU4R4G4R4
32 DATA"10,5",SCREEN WINDOW BY B
ARRY MITCHEL,"10,11",..... JUNE
 MCMLXXXVIII .....,"26,23",THIS
 PROGRAM SHOWS THAT BASIC
33 DATA"2,29",HAS FOUR WAYS TO S
CROLL THROUGH,"2,35",SPREADSHEET
S AND OTHER HIGH RES,"2,41",DISP
LAYS. YOU CAN BROWSE USING
34 DATA"2,47","THE ARROW, ENTER
AND CLEAR KEYS,","2,53",PLUS SHI
FT TO REPEAT. THIS TEXT,"2,59","
IS NORMAL WIDTH, BUT BELOW IT IS
35 DATA"2,65",DOUBLE WIDTH. TEXT
 AND GRAPHICS,"2,71C3","CAN BE M
IXED IN THREE COLORS,","2,77C2",
"AS YOU CAN SEE, SO CHARTS AND
36 DATA"2,83C4",GAMES CAN USE TH
ESE METHODS TOO.,"26,89",NOW PRE
SS THE DOWN ARROW TO,"2,95",CONT
INUE READING BELOW.
37 DATA"26,101",USE THE RIGHT AR
ROW NOW TO LE,"2,107",TO START T
HE NEXT LINE. A FASTER,"2,113",S
HIFT RIGHT ARROW. PRESS SHIFT @
38 DATA"26,119",THE TEXT COULD B
E REPLACED BY,"2,125",SCENES FRO
M A GAME OR ADVENTURE.,"2,131",Q
UADRANT BE CAN CHANGED QUICKLY
39 DATA"26,137",THIS ENTIRE TEXT
 IS ON EIGHT,"2,143",IT IS VIEWE
D ON A FIFTH PMODE ON,"2,149",OF
 EACH QUADRANT UNDER KEYBOARD
40 DATA"2,155",THE LOWER RIGHT Q
UADRANT AND SHI,"26,161",WHEN YO
U FINISH READING PRESS,"2,167",T
HE GRAPHICS PAGE LAYOUT. FOR MO
41 DATA"2,179",P.S. THE PROGRAM
CAN BE CHANGED,"42,185",TO WORK
WITH A JOYSTICK OR,"42,191",MOUS
E INSTEAD OF KEYBOARD.
42 DATA"2,101",ARN THAT THE ENTE
R KEY RETURNS,"10,107",WAY TO SC
AN RIGHT IS TO USE THE,"10,113",
TO PAUSE AT ANY POINT.
43 DATA"2,119"," CHARTS, GRAPHS,
 MUSIC SCORES OR","10,125","WITH
 DISK DRIVE, ANY UNGUARDED","2,1
31",TO ADD UNCERTAINTY TO GAMES.
44 DATA"2,137","PAGES, FOUR PMOD
E ONE QUADRANTS.","2,143",E WIND
OW WHICH COPIES A PIECE,"2,149",
CONTROL. THE CLEAR KEY MOVES TO
45 DATA"2,155",FT CLEAR GOES TO
UPPER RIGHT.,"2,161"," SHIFT CLE
AR TO SEE A DIAGRAM OF","2,167",
"RE INFORMATION, WRITE TO ME.
46 DATA"82,179",BARRY J. MITCHEL
,"82,185",LXX LONGVIEW ROAD,"82,
191",READING MA MDCCCLXVII
47 DATA"14,5C2",SCHEMATIC DIAGRA
M OF GRAPHICS,"6,11",PAGES. SCRE
EN WINDOW IS YELLOW.,"10,89",UPP
ER LEFT CORNER SHOWS PMODE.
48 POKE26,PEEK(52)+1AND255:POKE2
5,PEEK(51)-(PEEK(26)=0):DATA"180
,41",U,"180,59",D,"98,73",L,"154
,73",R,"178,18C4",W,"216,33",H
```

```
49 PMODE3:POKE188,PEEK(183):PCLE
AR6:POKE188,PEEK(186):PMODE1,9
50 POKE33,127:CLS3:PRINT"COCO2 H
IGH-RES GRAPHICS SCROLLER","  J
UNE '88 BY BARRY J. MITCHEL",,,"
TYPE 1,2,3,OR 4 TO CHOOSE METHOD
OF MOVING WINDOW ON 2 X 2 SCREEN
51 CLEAR:INPUT"1.GET/PUT (SIMPLE
 BUT SLOWEST)  2.MID$= (FASTER A
NY DIRECTION)  3.VAR$= (QUICKEST
 UP AND RIGHT) 4.PCLEAR (FASTEST
 DOWN AND LEFT)";M
52 W=255:H=191:E=PEEK(183):B=PEE
K(186):DIMD,R,U,L,S,P$,P,F,G,P$(
15),P(614):IFM=2ORM=3THENPOKE33,
B-1:FORL=0TO15:U=VARPTR(P$(15-L)
):POKEU,192:POKEU+2,L*3/4+B:POKE
U+3,L*192ANDW:NEXT:GOTO54
53 IFM=4THENPOKE9,PEEK(25):FORP=
27TO30:POKE(29>P)*18+44+P,PEEK(P
):NEXT:F=PEEK(31):G=PEEK(32)ELSE
IFM-1THEN51
54 PCOPY1TO9:PCOPY2TO10:GOTO56
55 PRINT"KEY"P"TIME"TIMER/60:EXE
C42961:EXEC
56 U=1+H-D:L=1+W-R:SCREEN1:EXEC4
4539:P=ASC(INKEY$):ONP-7GOTO85,7
6,66,,97,99:TIMER=0:IFP=21THEN85
ELSEIFP>95ORP<91THEN50ELSEONP-90
GOTO66,98,76:U=E-1:S=B-1
57 OND>11ANDM GOTO61,58,59,60:IF
P=95THEN55ELSE56
58 FORS=1TO15:MID$(P$(S-1),1)=P$
(S):NEXT:GOTO62
59 POKE35,U:POKE36,W:FORS=1TO15:
P$=P$(S):NEXT:GOTO62
60 PMODE1:POKE25,S:POKE27,U:POKE
26,65:POKE28,64:PCLEAR8:GOTO65:E
XECUTION POINTER+192
61 GET(0,0)-(W,179),P:PUT(0,12)-
(W,H),P
62 IFL THENPMODE1:GET(R,D-12)-(W
,D-1),P:PMODE1,9:PUT(0,0)-(L-1,1
1),P
63 IFR THENPMODE1,5:GET(0,D-12)-
(R-1,D-1),P:PMODE1,9:PUT(L,0)-(W
,11),P
64 D=D-12:IFP=95THEN57ELSE56
65 GOSUB95:GOTO62
66 U=180:S=193
67 OND<H ANDM GOTO68,69,70,75:IF
P=91THEN55ELSE56
68 GET(0,12)-(W,H),P:PUT(0,0)-(W
,U-1),P:GOTO72
69 FORS=14TO0STEP-1:MID$(P$(S+1)
,1)=P$(S):NEXT:GOTO72
70 S=-193:GOSUB94:GOTO72
71 GOSUB95'FOLLOWING LINE 75
72 IFL THENPMODE1,3:GET(R,D)-(W,
D+11),P:PMODE1,9:PUT(0,U)-(L-1,H
```

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```
),P
73 IFR THENPMODE1,7:GET(0,D)-(R-
1,D+11),P:PMODE1,9:PUT(L,U)-(W,H
),P
74 D=D+12:IFP=91THEN67ELSE56
75 PMODE1:POKE25,B:POKE26,S:POKE
27,E:POKE28,0:PCLEAR8:GOTO71:EXE
CUTION POINTER-192
76 L=W-7:S=PEEK(188)
77 ONR<W ANDM GOTO78,79,80,81:IF
P-9THEN55ELSE56
78 GET(8,0)-(W,H),P:PUT(0,0)-(W-
8,H),P:GOTO82
79 FORS=0TO15:MID$(P$(S),1)=MID$
(P$(S),2):NEXT:GOTO82
80 S=-2:GOSUB94:GOTO82
81 PMODE1:POKE25,B:POKE26,2:PCLE
AR8:POKE25,PEEK(9):POKE26,0:POKE
188,PEEK(183):PCLEAR8:GOSUB96:PO
KE188,S
82 IFU THENPMODE1,5:GET(R,D)-(R+
7,H),P:PMODE1,9:PUT(L,0)-(W,U-1)
,P
83 IFD THENPMODE1,7:GET(R,0)-(R+
7,D-1),P:PMODE1,9:PUT(L,U)-(W,H)
,P
84 R=R+8:IFP-9THEN77ELSE56
85 S=E-1
86 ONR>7ANDM GOTO87,88,89,90:IFP
-8THEN55ELSE56
87 GET(0,0)-(W-8,H),P:PUT(8,0)-(
W,H),P:GOTO91
88 FORS=0TO15:MID$(P$(S),2)=MID$
(P$(S),1):NEXT:GOTO91
89 S=0:GOSUB94:GOTO91
90 PMODE1:POKE25,B:POKE26,0:POKE
27,S:POKE28,255:PCLEAR8::GOSUB95
91 IFU THENPMODE1:GET(R-8,D)-(R-
1,H),P:PMODE1,9:PUT(0,0)-(7,U-1)
,P
92 IFD THENPMODE1,3:GET(R-8,0)-(
R-1,D-1),P:PMODE1,9:PUT(0,U)-(7,
H),P
93 R=R-8:IFP-8THEN86ELSE56
94 POKE36,W ANDS:POKE35,S/256+E+
48:FORS=0TO15:P$=P$(S):NEXT:PCOP
Y17TO9:PCOPY18TO10:RETURN
95 POKE25,PEEK(9):POKE27,PEEK(53
):POKE28,PEEK(54)
96 POKE29,PEEK(73):POKE30,PEEK(7
4):POKE31,F:POKE32,G:RETURN
97 PCOPY7TO9:PCOPY8TO10:R=256:D=
192:GOTO56
98 PCOPY5TO9:PCOPY6TO10:R=256:D=
0:GOTO56
99 R=0:D=(U>0AND12)+D:PMODE3:GET
(0,D/2)-(W,D/2+95),P:PMODE1,9:PU
T(0,0)-(W,H),P:GOTO56
```

Two-Liner Contest Winner . . .

This shortie is a Mastermind-type game in which the goal is to guess the computer's code (use four positions to play the "classic" version). Each position contains a number between 1 and 6. Type in your guess (for example, 2216) and press ENTER. CoCo responds with B (black) for a correct number in the correct position. W (white) indicates a number that is correct but in the wrong position. In a four-position game, four B's would indicate a win.

The listing:

```
0 CLS:PRINT@8,"MINI MASTERMIND":
INPUT"HOW MANY #'S";S:DIMN(S,2),
G(S):FORI=1TOS:N(I,1)=RND(6):NEX
T:PRINT"GUESS MY NUMBER":FORK=1T
O9999:FORI=1TOS:N(I,2)=N(I,1):NE
XT:PRINT:PRINTK;:INPUTA$:FORI=1T
OS:G(I)=VAL(MID$(A$,I,1)):NEXT:F
ORI=1TOS
1 A=(N(I,2)=G(I)):PRINTCHR$(66*-
A);:N(I,2)=N(I,2)*(A+1):G(I)=G(I
)*(A+1)+A:T=T-A:NEXT:IFT=S THENP
RINT" YOU WIN!"ELSET=0:FORI=1TOS
:FORJ=1TOS:A=(G(I)=N(J,2)):PRINT
CHR$(87*-A);:N(J,2)=N(J,2)*(A+1)
:G(I)=G(I)*(A+1)+A:NEXTJ,I,K '
(C) 1988 M. TOEPKE
```

Michael Toepke
Oak Harbor, WA

(For this winning two-liner contest entry, the author has been sent copies of both *The Rainbow Introductory Guide to Statistics* and its companion *The Rainbow Introductory Guide to Statistics Tape.*)

Listing 2: FASTSCRL

```
0 'ALL THE RIGHT MOVES'LISTING 2
 - BARRY J. MITCHEL - JUNE 1988
20 PMODE3:PCLEAR8:PCLS:SCREEN1,1
:LOADM"PAGES1-4",0:EXEC42961:PMO
DE3,5:PCLS:SCREEN1,0:LOADM"PAGES
5-8",0:EXEC42961
49 PMODE3:POKE188,PEEK(183):PCLE
AR6:POKE188,PEEK(186):PMODE1,9
50 CLEAR:CLS3:PRINT"COCO2 HIGH-R
ES GRAPHICS SCROLLER",," JUNE '
88 BY BARRY J. MITCHEL",,,"THIS
VERSION USES FASTEST METHODOF MO
VING WINDOW ON 2 X 2 SCREEN
51 PRINT"3.VAR$= (QUICKEST UP AN
D RIGHT) 4.PCLEAR (FASTEST DOWN
AND LEFT)",,"PRESS ANY KEY TO BE
GIN DEMO":EXEC44539
52 W=255:H=191:E=PEEK(183):B=PEE
K(186):DIMD,R,S,P$,F,G,P$(15),P(
38):FORL=0TO15:U=VARPTR(P$(15-L)
):POKEU,192:POKEU+2,L*3/4+B:POKE
U+3,L*192ANDW:NEXT
53 FORP=27TO30:POKE(P<29)*18+44+
P,PEEK(P):NEXT:F=PEEK(31):G=PEEK
(32)
54 PCOPY1TO9:PCOPY2TO10:GOTO56
55 PRINT"KEY"P"TIME"TIMER/60:EXE
C42961:EXEC
56 SCREEN1:POKE33,127:U=1+H-D:L=
1+W-R:EXEC44539:P=ASC(INKEY$):ON
P-7GOTO85,80,74,,97,99:TIMER=0:I
FP=21THEN85ELSEIFP>95ORP<91THEN5
0ELSEONP-90GOTO74,98,80
59 IFD<12THEN56ELSEPOKE33,B-1:U=
E-1:FORD=D TOD+(P=95AND12-D)STEP
-12:POKE35,U:POKE36,W:FORS=1TO15
:P$=P$(S):NEXT
62 IFL THENPMODE1:GET(R,D-12)-(W
,D-1),P:PMODE1,9:PUT(0,0)-(L-1,1
1),P
63 IFR THENPMODE1,5:GET(0,D-12)-
(R-1,D-1),P:PMODE1,9:PUT(L,0)-(W
,11),P
64 NEXT:IFP=95THEN55ELSE56
71 GOSUB95:IFL THENGET(R,D)-(W,D
+11),P:PMODE1,9:PUT(0,U)-(L-1,H)
,P
72 IFR THENPMODE1,7:GET(0,D)-(R-
1,D+11),P:PMODE1,9:PUT(L,U)-(W,H
),P
73 D=D+12:IFP=91THEN75ELSE56
74 U=180:S=193
75 IFD>H THEN55ELSEPMODE1,3:POKE
25,B:POKE26,S:POKE27,E:POKE28,0:
PCLEAR8
80 IFR>W THEN56ELSEPOKE33,B-1:L=
E+47:FORR=R TOW+(P=9ANDR-W)STEP8
:POKE35,L:POKE36,W-1:FORS=0TO15:
P$=P$(S):NEXT:PCOPY17TO9:PCOPY18
TO10
82 IFU THENPMODE1,5:GET(R,D)-(R+
7,H),P:PMODE1,9:PUT(W-7,0)-(W,U-
1),P
83 IFD THENPMODE1,7:GET(R,0)-(R+
7,D-1),P:PMODE1,9:PUT(W-7,U)-(W,
H),P
84 NEXT:IFP-9THEN55ELSE56
85 S=E-1
90 IFR>7THENPMODE1:POKE25,B:POKE
26,0:POKE27,S:POKE28,255:PCLEAR8
::GOSUB95ELSE55
91 IFU THENGET(R-8,D)-(R-1,H),P:
PMODE1,9:PUT(0,0)-(7,U-1),P
92 IFD THENPMODE1,3:GET(R-8,0)-(
R-1,D-1),P:PMODE1,9:PUT(0,U)-(7,
H),P
93 R=R-8:IFP-8THEN90ELSE56
95 POKE27,PEEK(53):POKE28,PEEK(5
4):POKE29,PEEK(73):POKE30,PEEK(7
4):POKE31,F:POKE32,G:POKE25,E:RE
TURN
97 PCOPY7TO9:PCOPY8TO10:R=256:D=
192:GOTO56
98 PCOPY5TO9:PCOPY6TO10:R=256:D=
0:GOTO56
99 R=0:D=(U>0AND12)+D:FORU=0TOH
STEP12:L=(D+U)/2:PMODE3:GET(0,L)
-(W,L+5),P:PMODE1,9:PUT(0,U)-(W,
U+11),P:NEXT:GOTO56
```

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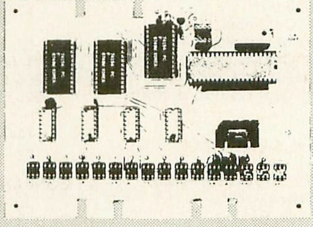

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27,270 ★Jocelyn Hellyer, Montgomery, IL
25,510 Donald Knudson, Minot, ND
20,480 Kevin Pereira, Corsicana, TX
SHOOT'N RANGE (THE RAINBOW, 8/87)
55,623 ★Paul Robbins, Picayune, MS
14,702 Richard Winkelbauer, Bronx, NY
13,794 Phillip Holsten, Modesto, CA
6,082 David Morrison, Brewer, ME
5,433 Benoit Landry, Drummondville, Quebec
SLAY THE NERIUS *(Radio Shack)*
73,091 ★Jeff Remick, Warren, MI

SPACE INVADERS *(Spectral Associates)*
3,920 ★Ari Enkin, Neapen, Ontario
SPACE ASSAULT *(Radio Shack)*
13,110 ★Jeff Remick, Warren, MI
7,280 Jason Kopp, Downs, IL
6,200 John Weaver, Amsterdam, NY
SPEED RACER *(MichTron)*
94,430 ★Christopher Cromwell, Monument, CO
SPEEDSTER (THE RAINBOW 8/87)
211,300 ★Paul Robbins, Picayune, MS
103,140 Richard Winkelbauer, Bronx, NY
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1,840 Dave Staub, Moundsville, WV
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303,520 ★Mavis Hartmann, Osoyoos, British Columbia
200,670 Denise Root, Thorndale, PA
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2,888 ★Paul Robbins, Picayune, MS
2,768 H. Dingwell, Litchfield, CT
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THEXDER *(Sierra On-Line)*
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76,030 ★Brent Morgan, Centerville, OH
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132 Matthew Fumich, Munford, TN
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196,000 ★Cassaundra Stewart, Sacramento, CA
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53,280 ★William Currie, Bryans Road, MD
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11,902 Martha James, Swarthmore, PA
10,489 Karl Gulliford, Summerville, SC
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10,577,051 ★Doug Lute, Clymer, PA
WILDWEST *(Tom Mix)*
35 ★Paul Summers, Orange Park, FL
WISHBRINGER *(Infocom)*
400/201 ★Brad Wilson, Lithia Springs, GA
WIZARD'S DEN *(Tom Mix)*
593,950 ★Richard Winkelbauer, Bronx, NY
425,350 Leif Smedberg, Columbia City, IN
195,050 Mark Touchette, Preston, CT
WRESTLE MANIAC *(Diecom)*
956,971 ★Marc Reiter, Cincinnati, OH
546,315 Louis Bouchard, Gatineau, Quebec
45,483 Tony Bacon, Mt. Vernon, IN
42,105 David Brown, New Waterford, Nova Scotia
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ZONERUNNER *(Radio Shack)*
5,918 ★Sam Zehel, Coal Center, PA
ZONX (THE RAINBOW, 10/85)
12,000 ★Adam Broughton, Morris, PA

— Angela Kapfhammer

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

In response to questions from:

- Timothy Bishop: In *Black Sanctum*, the woman's hair is one of the ingredients you need to complete the game. If you aren't wearing the cloak, you will get sent back into the closet where the mirror is.

- James Wilcox, Mike Walter and Mark Fernandez: In *Dungeons of Daggorath*, you get ice out of rime with the definition of rime, which is white frost or the freezing of vapor in drifting fog. The strategy of killing the wizard's image is to attack and run. The evil knight is killed by 10 or 15 hits with the iron sword. Just remember to drop all the items except the attack weapon and the torch. After you kill the wizard's image you cannot get your stuff or the scroll back.

Mike Sillanpaa
Campbell River, British Columbia

- Charles Bell: In *Lighthouse Adventure*, to get past the guard `SAY MARPLE`.

In *Escape from Sparta*, each computer can be accessed by inserting a chip (each computer takes only one color) and typing `ON`. The chips are in the rubble remaining from destroyed robots. Just `SEARCH RUBBLE` and `TAKE GREENCHIP` (or `REDCHIP` or `SILVERCHIP`). Normally a robot in the same room as a computer will have a chip that turns on the computer. The Silverchip only works in one of the Escape Pods.

Joel F. Klein
Indianapolis, IN

- John Sprinkle: To pass the 3rd level in *Dungeons of Daggorath* you have to destroy the wizard by going to the longest hall in the game and hitting the wizard once with the Ice ring and twice with the Fire ring. He will die and drop a scroll that you can't pick up because you are transported to the fourth level.
- Tommy Upton: To get past the wheat field in *Dallas Quest* go in the pasture and move around; the bulls will become restless. They will kill you if you do not `PLAY HORN`. The bulls will uncover a grave stone that will tell you the direction to go in the wheat field.

John Johnson
Winter Park, FL

Scoreboard:

In *Trekboer*, when you give the capsule to the spider it doesn't kill him, it merely knocks him out. The second spider you encounter is really the first one back in action. If you pick up the spider and drop him in the room where you get the plant and are ready to leave, type `PRESS RED` and go to the grate. You will have no problem with the second spider.

I can get past the grate to the stream of lava, go east and west and over the rubble, but I can't get out.

Melanie Lapoint
Fitchburg, MA

Scoreboard:

In *Sands of Egypt*, how do you remove the scepter from the carving? When I type `HELP`, it says "try the snake oil." Well, I can oil the scepter, but then when I type `GET SCEPTER` the response is "how?" I've tried using the oil in every way I can think of and the scepter remains tightly clasped in the Pharaoh's hand. I even tried drinking the oil and that really was a mistake.

Floyd Keirnan
Orange, CA

Scoreboard:

How do you get to the maze in *Pyramid*? Where is the sarcophagus, and how do you get past the serpent?

Chris Franson
Terre Haute, IN

Scoreboard:

In *Wild West*, shoot the miners. Go to Room 4 in the hotel, show Jenny your badge, and get the paper from the desk in the lobby. Then go to the canyon and look at the desert. You will find a piece of charcoal. Draw a fake copy of the map. Does anybody know what to do after that?

In *Sea Quest*, break the window of the beach house. Inside you will find the credit card. Dig in the cave to find the bottle of rum to give to the pirate so he will let you on his island.

In *Dallas Quest*, an easier way to get all of your things down into the secret tunnel is to put everything in the knapsack except the flashlight. Drop the knapsack and climb the ladder. Drop the flashlight in the tunnel and go east, then south. Get the knapsack and climb the ladder. Pick up the flashlight and go west. This saves the batteries in the flashlight.

Chad Presley
Luseland, Saskatchewan

Scoreboard:

In *Dungeons of Daggorath*, I can only get to the second level. A knight always kills me. How can I kill him? I also acquired a ring on the first level, and I incanted it as fire. When I killed a stone giant, it turned gold. What does that mean?

Patrice Colancecco
Perkasie, PA

Scoreboard:

Here are a few tips for the *Interbank Incident*.

Bribe everybody; give the knife to the salmon salesman; search all trees, fountains, beaches, lockers and drawers; give the piano strings to the piano player; wear the military hat from the boutique in Paris to get into the naval base in Seattle; don't give the wallet to the guard in Seattle or the program will bomb.

Use the computer, cartridge, tracker and rod in both museums to fill the disk with the files *UNLOCK1* and *UNLOCK2*; and pry up the manhole cover (in Europe) with the steel rod.

Shara and Chris Euton
Lilburn, GA

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

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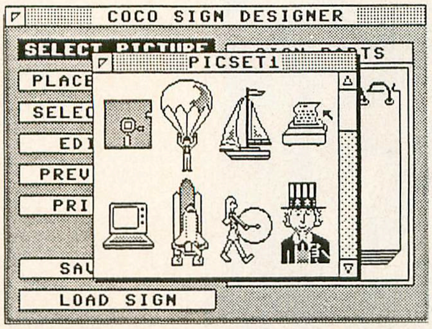
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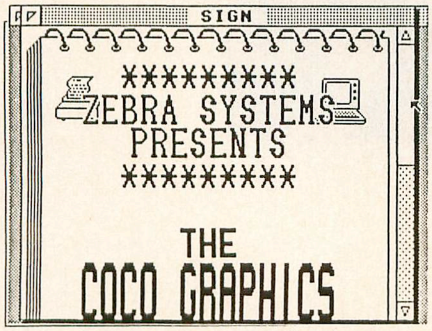
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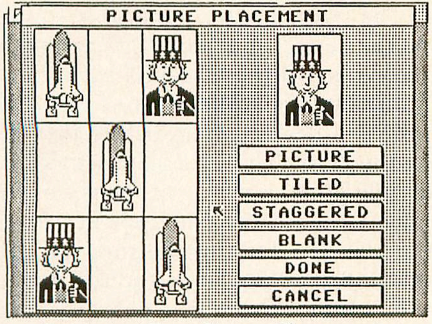
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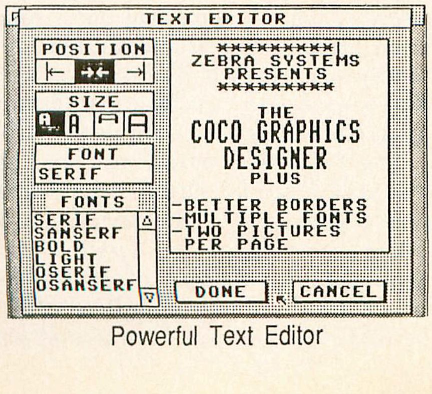
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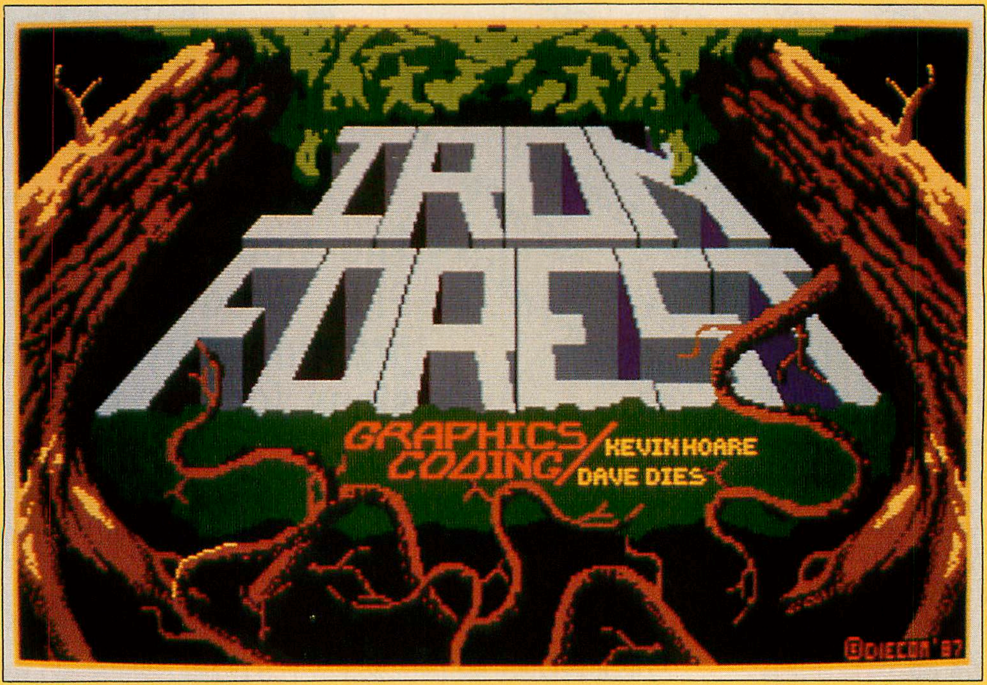


Software/Hardware CoCo 3

Iron Forest — Phaser Action Comes to the CoCo 3

I do not know any trolls personally. In fact, other than an especially surly waiter a few years ago, I'm not sure I've met any trolls.

However, based on a recent experience, I now know the sound of a troll's voice. As the Diecom Products' *Iron Forest* title screen came up on the monitor, a low and cynical voice grated, "Welcome to the *Iron Forest*." This was at first a little disconcerting to one who is alone in the house, and whose computer is in the basement. Cooler heads prevailed, just before I started to bolt for the stairs.

This is another game exclusively for the CoCo 3 and a disk drive. The main disk is copy-protected, but Diecom encourages you to back up the graphics disk. The set requires a light phaser and light phaser interface, which makes it a bit expensive in the way of "start-up" costs; but there are other Diecom games that also use the light phaser, so it's a one-time expense.

The graphics . . . ah, the graphics. They are just as good on an RGB monitor as in any commercial arcade game, though slightly less spectacular on a color television. And you don't have to keep plunking quarters into your CoCo, either.

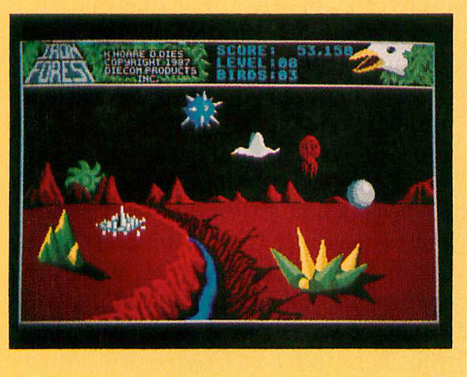
The game's basic premise is simple: As the sacred white dove flies across the screen, it will be attacked by various, numerous and sundry monsters. Your job is to destroy them before they get to the bird. This is a new wrinkle in arcade-style games; not only do you have to shoot the bad guys in droves, but also avoid hitting the good gull, ah, dove. This is similar to the FBI's reaction range, where you have to make split-second decisions as targets suddenly appear — some bad guys, some good guys. The instructors don't look kindly on agents who shoot an innocent person, and the program does not appreciate players who shoot the bird.

You begin with three birds and are awarded a "bonus" bird for each 50,000 points you earn — not an easy task. There are a total of 10 different screens arranged in a pattern of 15 boards. When (and if) you complete all 15 boards, the patterns repeat and the monsters move faster — as if things weren't already bad enough.

As the instructions state, the light phaser takes a little getting used to. That means you have to work out your own Kentucky Windage and Tennessee Elevation to compensate for the sights being just a little bit off-true. Since a small, blue explosion shows on the screen when you fire the phaser, you ex-tankers can apply the old "Burst on Target" technique — noting where the "blue tracer" passed the target and moving the phaser so the next shot will adjust for that error.

The next shot, by the way, isn't instantaneous, which I like. That way, people with a tendency to hold their finger on the trigger will not, repeat *not*, get a solid stream of phaser bolts. It does take a fraction of a second to reload, guys. The instructions also tell you to take the 9-volt battery out of the phaser interface/adapter when you're not playing; heed the instruction. Overnight, the adapter completely drained a new battery when I forgot to remove it.

The scenery appears to have been designed by a team made up of H.P. Lovecraft, J.R.R. Tolkien and Stephen Spielberg. There are views of exotic planets, strange and bizarre Freudian landscapes and decidedly offbeat architecture. It's worth attempting to get to the higher levels just to see what new terrain you'll be confronted with.



The monsters? There are green self-propelled saw blades, blue-studded spheres, skulls, wraiths, beings that look like baboons wearing scuba gear, giant spiders and something that looks suspiciously like a demented cricket. Just tell me it's not Jiminy Cricket gone bad! And then there's the . . . well, you can find out about that one by yourself.

The monsters are also sneaky. While you're involved in blasting one of them, another will slide deftly into some portion of the terrain that matches its

Larger Than Life

"Vampire! Vampire!" the radar console operator shouted. His SPQR-79 had just detected a missile launch from the incoming Bear Bomber. It looked like a small volcanic eruption on the detail screen.

"Transfer firing parameters and data to chaff control," the watch officer ordered grimly. He looked around the dimly lit Combat Information Center. Other crewmen had momentarily stopped their own duties and were gazing curiously at the large blue situation display, which now showed the incoming hostile missile.

"Chaff control malfunction!"

"Put it on manual! CIC to bridge: Chaff launcher on manual. Request permission to fire."

"Bridge to CIC: Fire when ready, grid to lee."

"Fire one!"

We've come a long way from the days of playing ping-pong on television screens, using a device that, by comparison with today's computer-aided simulations, is straight out of the Bronze Age. The above conversation could have taken place at a U.S. Navy training site, simulating the actions taken during highly complex and technologically loaded modern naval combat.

Although there are still plenty of arcade games around, even they are getting more and more sophisticated as companies find new ways to challenge players. Just having a quick trigger finger isn't enough; neither is the ability to keep a finger down on the button while the machine unrealistically produces an endless supply of bullets, laser bolts or boulders. Guile and the ability to absorb seemingly unrelated facts into a whole and make a decision are becoming more important, and thus games are becoming more realistic and lifelike.

The U.S. Army has a tank gunnery simulator that looks and even feels like the gunner's station in an M-1 Abrams tank. The action is so realistic that trainees have been known to leave the simulator in a cold sweat. Airlines have used simulators for years (and these have also caused trainees to break out in a cold sweat).

Now some of that electronic wizardry and imagination is falling into the hands of the normal citizen. We can try our hand at controlling air traffic, sinking enemy ships from our submarine or correcting the environmental ills of a strange new world. Not only has the software gotten more sophisticated, some of it includes new hardware to increase our enjoyment and add to the realism. Future "games" including the new hardware may cause a sharp rise in deodorant sales.

Those of us who have "passed the big four-oh" can remember back to the days when recreational technological marvels were basically confined to pinball machines. Now we're deluged with products and nifty little electronic gadgets to make our lives more interesting, more productive and sometimes a lot more fun. There has to be a certain number of people out there who can't wait to fire up their CoCo at the end of a long and difficult day, just so they can take out their frustrations on all sorts of enemies, foreign or domestic or alien.

Physical exercise, of course, is a good way to work off those destructive tendencies, but isn't always practical in the winter. A computer, especially one such as the CoCo, having so many companies writing excellent software for it, can be a great companion at those times. It can even be used to pull a family back together and away from those infernal brain-bashing devices called sitcoms, especially if there are games that can be played by several people.

"The chaff screen is drifting too fast!"

"Fire two! Fire three! Arm the Phalanx!"

Too late. Impact came three seconds later.

The lights came on and the chief instructor walked into the room. "All right, men, let's analyze what happened and what could've been done to prevent the damage or loss of your ship."

We've come a long way from ping-pong, baby.

Listen carefully — that sound on the sonar. It is probably a Viktor. "Sounds like the Kharkov, sir."

"Range?"

"Twelve thousand yards, sir."

"He's so close to our territorial waters. If he gets too close, lash him with the targeting sonar."

Piiiiiinnnnnnnnngggggg.

Pong! □

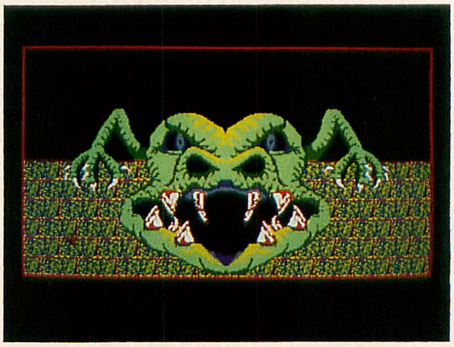
color and wait there for the bird to fly by. Some are more subtle than others, which means you've got to pay attention constantly. What you don't need is for one of those lurking beasts to spring suddenly on your bird, a deed that results in two pitiful caws and a spray of white feathers. This sound and feathery explosion also occurs if you happen to shoot your own bird in the excitement of the moment.

Which leads to a theory. Try keeping both eyes open while still sighting with your "shooting eye." That'll help you keep track of the entire screen. Unfortunately, it may also result in more phaser-soiled doves, because your aim may not be as precise when you're trying to destroy a monster on a collision course with your bird.

For the graphics-minded, devotees of Rambo movies and the like, the monsters explode very satisfyingly when hit, scattering fragments all over the screen as well as producing a small "blam" type of sound.

It should be intuitively obvious to even the most casual observer that the game's difficulty increases in direct proportion to the level attained, primarily due to the denser population of monsters and their increased velocities. In short, this whole thing turns into a gigantic goat-rope at the higher levels. This is when old age and treachery come in handy, helping to anticipate where the next monster will come from and zapping it when it appears.

After about eight games, I had progressed right up to Level 10 and scored some 111,000 points. Not too bad for a guy who dislikes arcade games because his reflexes have slowed down.



The light phaser adapter/interface plugs into the serial I/O and right joystick ports. It has an 8-foot cord leading to the light phaser itself. After congratulating myself for doing so well at the 2-foot range, I foolishly moved to the cord's full length.

A whole new game, pilgrim. No more virtually point-blank-range volleys; it becomes long-range sniper fire. It is difficult to see those little blue bursts so you can adjust your shots. The "tracers" aren't nearly as helpful and the phrase "You shot your bird!" is heard with alarming regularity. My 111,000 point record dropped to 1,800 as avoiding the sight of detonating doves became much more of a challenge. For that matter, it had become yet another of those ugly reminders about my reflexes.

And then a devious thought came to me. My youngest boy, the arcade ace, showed considerable interest in the game, particularly in showing me up. If I charged him 25 cents for every two games, he'd get to play twice as much for the same amount of money he spends in the arcades, and he'd be staying away from those arcade halls right here in River City — and I'd pay for the whole thing in a month.

(Parents of the world! Rise and unite to crush the oppressor arcades! Establish your own independent family entertainment center and rake in the dough! Save your children before they begin using words such as "y'know" and "awesome.")

The concept of supplemental income aside, this is a heck of a game.

Depending largely on the range, you can play *Iron Forest* purely to exercise your destructive tendencies in a socially

Focus on the Phaser Folks

Remember the television commercial where the personnel manager asks, "You know a lot about computer games. What do you know about computers?" The applicant shrinks visibly before our eyes.

Not to worry, fantasy game fans. Dave Dies and Kevin Hoare of Diecom Products, Inc., know a lot about both. They are the creators of *Iron Forest* and are avid computer fantasy game players in their own rights. Having sampled what is out there, they decided to add another dimension to fantasy games by developing hardware as well as software.

The result is the light phaser. At first they tried one of their own design, but found that the Sega light phaser served their purpose at a lesser price. A friend who is a programmer and engineer developed the interface box.

The result is also brilliant graphics, produced primarily by Kevin Hoare. He must be a very patient man to have done that; hats off to him.

Diecom Products, which will be four years old in October '88, is based in the town of Milton, Ontario, about 30 miles west of Toronto (pronounced "Tronto" by the inhabitants). Although Dave Dies said they do accept drop-in customers, the town doesn't have the population to support a computer software company, so most of their business comes through the mail.

At the moment, they devote their talents to the CoCo exclusively, but might expand. Take heart, CoCo 1 and 2 users! They also write software to support your beloved computers and, in fact, are hoping to write a light phaser game for the early CoCos. I think this is a good idea because a lot of people really can't spring for the extra bucks to convert to the CoCo 3.

The next phaser game coming out, *Medieval Madness*, has you using the light phaser against the appropriate medieval monsters. This includes dragons, but I forgot to ask about trolls. The next projects for the light phaser series could be a Western shootout, a war scenario (perhaps Vietnam) or a futuristic spacecraft game. Other ideas are to design a game that uses two light phasers so that players can compete directly with each other.

Just think, direct competition might even involve two sacred white doves, and you could end up blowing your opponent's bird to smithereens. What a grand way to cement a friendship.

The latest hardware project — for the CoCo 3 — is a digital sound synthesizer. By using the hardware coupled with the software, you could record and alter sound, music and voices. The results would be stored on the disk for replay.

Dave Dies used his sister's voice, recorded first at a high rate and then slowed down, to produce the troll's voice that made me look nervously over my shoulder for a split second. They experimented for about six hours to get the right sound.

These appear to be people with diabolical and horribly logical minds, despite that slight accent Dave exhibited during the telephone interview — an accent so many Americans find charming. That includes me, but I'm able sometimes to see past the surface. Lurking somewhere behind that facade of civility and technological expertise may lie the heart of a demon. Mind you, one with the ability to amuse you for hours on end, but a demon nevertheless.

From a sample of one of its games, I think this company has great things ahead of it. If the quality continues to be on the same level as *Iron Forest*, I'm sure of it. □

acceptable manner, have a challenging game, or participate in a real test of your marksmanship skills. Diecom Products has a winner here.

(Diecom Products, Inc., 6715 Fifth Line, Milton, Ont., L9T 2X8, 416-878-8358; $29.95 U.S., $37.95 CDN; with phaser and interface, $74.95 U.S., $93.95 CDN)

— John M. Hebert

Software CoCo 1, 2 & 3

Legend Quest — Beyond the Rainbow

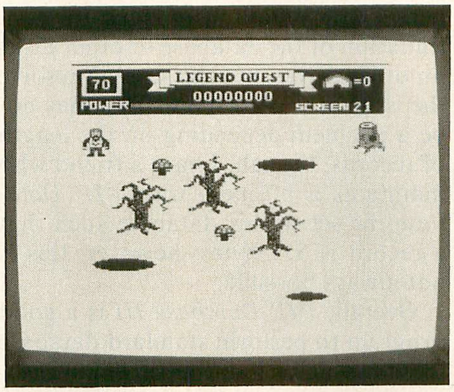
Legend Quest is a fun, high resolution graphics Adventure that requires a joystick and a minimum of 64K ECB. The object of the game is to guide your man (Professor Ludwig) through a maze in search of the gold at the end of the rainbow.

There are a total of five missing pieces of the rainbow that must be collected before your time runs out. Whenever you collect a piece, the timer resets. You will have to guide Professor Ludwig through not only the Enchanted Forest and the Living Cemetery, but also the Deserted Castle, the Temple of Blue Gold, the Hidden Caverns, the Lair of Hormelia and, finally, the Riddle of the Three Locks.

As you advance through the screens, you will be confronted by various creatures that will try to stop your progress. If one of them hits you, you will lose one unit from your power supply. Also, you should avoid the shrinking and expanding lava pits and other hazards you'll run up against in your quest for the gold. One of my favorite screens is the Living Cemetery — skeletons pop up from their graves! If you get too close to them, Professor Ludwig begins to shake from fear.

During game play you can map your progress so as not to retrace your path. You may see the map at any time by pressing the joystick firebutton. The map is displayed on an 8-by-8 square grid; the number of the screen you are currently occupying is also displayed. A bonus is given to those who visit all 64 screens. The game begins with Professor Ludwig having a full 15 units of power; it ends when you either run out of power or time on the clock.

The program, which is supplied only on disk, is not copy-protected, so you can make a backup copy for your own protection. The game is simple to load. After typing `RUN "LEGEND"` you are greeted with a screen in the form of a scroll that unrolls and displays the title. Pressing the firebutton on the right joystick starts the game.



If you run this program on a CoCo 3 hooked up to an RGB monitor, you will get a black-and-white picture. Using a color composite monitor will provide color. *Legend Quest* offers good graphics and colorful effects. The animation is smooth, and movement is controlled with the right joystick.

Legend Quest is a fun game that's fine for all ages, and I would like to see it available on tape as well as on disk. The action is fast, the sound effects are cute, and the plot is a refreshing diversion from the usual CoCo fare.

(Nick Bradbury, 10500 Sandpiper Lane, Knoxville, TN 37922, 615-966-0172; $15)

— Robert Gray

Software CoCo 3

VIP Database III — Information Management on the CoCo 3

VIP Database is certainly not a newcomer to the Color Computer software market. In fact, its origins go back almost to the beginning of the Color Computer. Part of the VIP library of integrated software, *VIP Database* was originally developed by VIP Technologies and recently acquired by SD Enterprises, a company that has been upgrading the VIP library to take advantage of the CoCo 3's features.

VIP Database III, as the latest version is called, has been optimized for the CoCo 3. It is essentially the same program that runs on the Color Computer 1 and 2, but adds the following enhancements: faster clock speed, 80-column display, more memory, a print spooler and in-memory sorting. And it retains full compatibility with databases created by the older versions of the program.

The original *VIP Database* was reviewed by Frank J. Esser (July 1984, Page 245). This is an in-depth review, and I strongly recommend readers interested in this program to read it, as I will not go into all the details that Mr. Esser has previously covered. Briefly, *VIP Database III* provides all the capability of a good basic database program: sorting, screen and print formatting, and multi-key search capability with relational operators (i.e., it can let you pinpoint people having last names beginning with D *and* having a ZIP code of 56*xxx*).

VIP Database III comes with a well-written users manual; however, the screens are designed such that you almost don't need the manual. All of the commands are nicely displayed on the bottom four lines of the screen. Color, which is user-controlled, makes for pleasing, easy-to-read screens.

Creating the database is very easy. With a full-screen editor, the user simply creates a form that contains field names (such as Name, Address, City, etc.), leaving the appropriate amount of space for each field in the record. (Note: *VIP Database* refers to each record as a file. This is not standard nomenclature for databases and could be somewhat confusing to the new user.) This form is then used for data input and editing, as well as for searching.

Searches, including multi-field searches, are accomplished painlessly. Simply call up the screen form and move the cursor to the field of interest — ZIP codes, for example. Enter the ZIP code for the search and the program begins searching. For multi-field searches, you fill in the appropriate fields and respond to the prompts for the type of relation (equal, less than or greater than, etc.).

Report generation is also easy. Again, using the full-screen editor, you design a form that will contain the information you want in the report. Although the setup is the same, the report form is different from the screen form. In fact, you may have a number of report forms saved on disk depending on your needs. When it comes to printing a report, *VIP Database* has a built-in print spooler — which means that you can print a report and do other functions, like searching for more information, within the program at the same time. Note that the print spooler is effective only while *VIP Database* is running.

Finally, *VIP Database III* contains a math package, which allows calculations based on data contained in the database fields. With this capability you can add, subtract, multiply or divide any of the numeric fields in the database. This would make it very easy to set up a small inventory or similar type business package.

Program operation is very straightforward, and *VIP Database III*'s display of commands and options makes it easy for novice users.

I have one major complaint, which was also noted by Mr. Esser: *VIP Database III* saves information to disk in 512-byte blocks. In other words, if a record contains 260 bytes, two blocks or 512 bytes are set aside on the disk for that record. There will be a significant waste of disk space as you build a large database with this size of record.

Because it is difficult to create a database with records in increments of 256, wasted disk space becomes a problem. The program *does* allow for continuation of the database to other disks on other drives, but this doesn't resolve the issue of wasted space. This may not be a problem depending on the length of records, though. I have a friend who maintains a business with *VIP Database*; he set up his database such that a record is 511 bytes; however, this is not always possible.

Overall, *VIP Database III* is a good program to perform standard database functions in the home or small business.

(SD Enterprises, P.O. Box 1233, Gresham, OR 97030, 503-663-2865; $69.95 for disk, $39.95 for upgrade, $3 for S/H)

— Donald Dollberg

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GCS File Transfer Utilities — Bridging the Cross-DOS Gap

Imagine that you have a Flex-based computer at home, along with a CoCo 3, of course, and at the office you have a CoCo 3 and a Tandy 1000 TX. While at home you write a text file using an editor under Flex and then decide to transfer the file to the CoCo 3 for merging into an OS-9 document. Well, you have a utility that can do that, because you just bought *File Transfer Utilities* from Granite Computer Systems at RAINBOWfest Princeton.

You take the Flex file on its Flex-formatted disk, boot *Multi-Vue* and select the `FTU` icon, and up comes the *File Transfer Utilities* screen. Selecting Flex Transfers, you open a dialog box that selects writing a Flex file onto an OS-9 disk. In seconds the drive thrums, and you have transferred your file. Opening a shell, you do a directory on the OS-9 disk, and sure enough, it's there. Great. Then you decide to take the file to work the next day, because you have some text on the Tandy 1000 that you want to merge into this document.

At work the next day, you turn on the CoCo (which is not equipped with *Multi-Vue*) and boot OS-9. You type in `PCWrite`, providing parameters for the name of the file to transfer and the drive it is on — and the same file that started off in Flex format is now on a PC disk. You insert the disk in the Tandy 1000, pleased with the results of your work, and go on about your business.

Does this sound farfetched? Well, if it does, read on, because with *File Transfer Utilities* from Granite Computer Systems, all of what you have just read and more is possible.

File Transfer Utilities is a package containing programs that run under OS-9 to transfer files between different operating systems and disk file formats. MS-DOS users, please note: This file transfer utility will transfer only text files between operating systems, as the operation codes in the Intel (PC) computers and the Motorola (CoCo) computers are not compatible. Binary and text files can be passed between Flex and OS-9, but only text can be passed between Disk BASIC and OS-9. Flex users, please note: Flex-based binary files are not directly executable under OS-9.

FTU uses standard OS-9 syntax and is very easy to learn and use. There is a thorough 20-page manual that gives instructions on loading the programs and a brief tutorial on using the transfer utilities. A nice added feature is that each program will give you online examples of how it is used.

Some of the commands available are `PCDir`, `PCDump`, `PCRead`, `PCWrite`, `PCDelete`, `PCRename` and `PCFormat`. Most of these commands are replicated under the Disk BASIC and Flex DOS file transfer utilities, but not all of them. The `PCDump` feature, available in both the Disk BASIC and Flex DOS transfer utilities, displays individual sectors on the disk. One slight drawback to *FTU* is that it will read only first-level subdirectories on a PC disk — this is because it was not feasible to implement the full MS-DOS hierarchical handling capabilities. I found this to be only the slightest inconvenience.

FTU provides a lot of convenience and versatility. Output can be redirected from the screen to a file or a printer if the user likes. So, if you wanted to print a file on a PC disk from your CoCo, you could `PCRead` it to the printer without needing to change machines!

Some Hints, Tips and Bewares

FTU requires that *SDisk*, a software package from the D.P. Johnson Company of Portland, Oregon, be in memory when *FTU* is run. There are no easy options around this — I could not run *FTU* without *SDisk*. There is also an *SDisk3* program. Either version of *SDisk* is available from D.P. Johnson or Granite Computer Systems for $29.95, plus shipping and handling. The OS-9 driver, called `CC3Disk`, which is loaded and linked into memory at startup, must be unlinked from memory after loading and linking *SDisk*.

In addition, you must have at least two disk drives. One can be a hard drive, but I recommend that at least one of the other drives be double-sided/double-density. This allows room for a large commands directory that can hold all the programs you need on one system disk, making the file transfer process a much easier one. It is possible to use two 35-track, single-sided/double-density disks (Radio Shack standard), but this means that disk swaps will be necessary. All of this information and more is clearly explained in the documentation. Although the manual is well-written, I would recommend a good working knowledge of OS-9 before leaping into the fray with *FTU*.

CoCo 3 users with Multi-Pak Interfaces, be sure that you have upgraded your Multi-Pak to be compatible with the CoCo 3, as non-upgraded Multi-Paks may give you trouble with these transfer utilities.

You must specify single- or double-sided disks when ordering, and also which version of the program you want — there are two. The *Multi-Vue* version requires two disk drives, 512K memory, *Multi-Vue* and OS-9 Level II. The standard version requires a CoCo 1 or 2 and OS-9 Level I or II, 64K of memory and two disk drives. Both versions require some form of *SDisk* (*Multi-Vue* requires *SDisk3*).

File Transfer Utilities from Granite Computer Systems is a well-designed file transfer utility. Instead of being a stripped-down program, this is a full-featured and well-programmed package that goes a step further than it needs to, giving the user some nice extras. The fact that the `Read` programs automatically strip line feeds (or optionally, retain them) is an extra. The capability of specifying many disk formats under different operating systems is another nice extra. There are other extras, too, but too many to list here!

The program works quickly, effectively and accurately, and is easy to operate. The documentation is good and solid, and so is the online help. While it is a costly package when combined with the *SDisk* program it requires to operate, in the context of

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allowing you to transfer files among no less than four different operating systems *FTU* is more than worth its price. And it could be priceless to the user in a pinch. If you are a multicomputer user, I can recommend Granite Computer Systems' *File Transfer Utilities* for the CoCo without reservations as one of the most important utilities in a CoCo software library.

(Granite Computer Systems, Route 2, Box 445, Hillsborough, NH 03244, 603-464-3850; $44.95 plus $1.50 S/H, $54.95 plus $1.50 for *Multi-Vue* version: First product review from this company appearing in THE RAINBOW.)

— Jeffrey S. Parker

Software CoCo 3

Super Pitfall — Back in the Salt Mines

Super Pitfall is a new action arcade game that's written by Steve Bjork, published by Activison and marketed by Tandy. It comes on a ROM pack for the CoCo 3. In the game you play the part of Pitfall Harry, that courageous — and in this case, desperate — explorer who must comb the depths of many caverns in his triple quest.

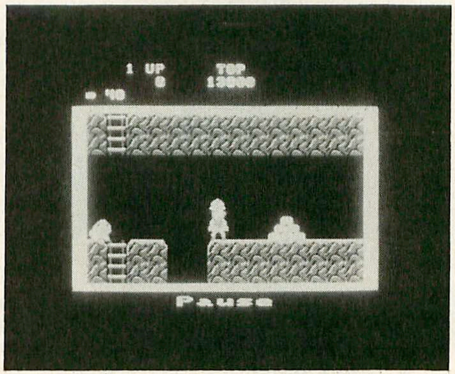
Pitfall Harry's sweetheart, Rhonda, somehow managed to lose her way while exploring the caves and has been turned to stone. You must locate an antidote from another cave in order to set her free. Harry's "feline friend," Quickclaw the cat, has also met a dastardly fate in the caves — he has been caged in an iron kennel, and a gold key is required to free him. And, oh, yes, rumor has it that the priceless Raj diamond was lost in the caves years ago.

Your map led only to the cave's entrance. From there you must rely on your experience, cunning, wit (and maybe a gun, if one is to be found) to help you face the perils ahead. Using a joystick or the keyboard arrow keys, you will climb, swim and jump your way through a myriad of caverns, seeking treasure and trying to avoid the frogs, spiders, snakes, scorpions, bats, vultures, Skullmen and Lizardmen, piranhas, and other creatures beyond description. But there are piles of gold just lying around to sweeten the deal.

The graphics are great. When I slipped the ROM pack into my CoCo 3, I felt as if I had brought home an arcade machine. The different caves and their "props" are fantastic (would you believe an underground city, or a balloon that, if you catch it just right, can take you up to other levels?). Harry's movement is smooth. There are no quirky mishaps — and no one to blame for the jams you get into but yourself and the entourage of creatures that lurk around every corner. Trying to escape from or kill these beasties without falling into the many traps will keep you on your toes. And once you're in the caves, Pitfall Harry, you're locked in: You can't exit until all three of your missions are accomplished.

After you insert the pack and turn on the CoCo, the game automatically boots and presents you with an options menu. There are three levels of play: novice, expert and explorer. In the novice level, the treasures Harry seeks are visible — familiarizing you with their locations and preparing you for the expert level, in which they are all *in*visible.

In the expert mode, you'll find it necessary to hop around in order to find the treasure (treasure and other finds are hung just a little above Harry's reach, so he has to jump to get them). In the explorer level, Harry has unlimited lives and the treasure remains visible. Explorer may prove to be the most practical level when learning the ropes and honing your skills.



One or two players can get involved — both joystick ports can be used. It's even possible for the two players to be on different skill levels. A note to keyboard users: If you press the BREAK key while playing, your efforts will be lost, and the game will end. Near the end of a long expedition this could dampen your spirits. Mine were dampened, at a very inappropriate time — I'd just rescued Rhonda and Quickclaw and was close to finishing the game. I've never been that close since.

Super Pitfall is fun and challenging and will provide hours of enjoyment for adventurers of every age. This one belongs in your CoCo 3 library. Let the games begin!

(Activision, distributed by Tandy; $29.95: Available in Radio Shack stores nationwide.)

— Tony Olive

Software

Wildcard Copy — A Pseudo Copy "*" Command

If you do a lot of file handling or have many disks with related files scattered around, *Wildcard Copy* is the utility for you! It provides a means of doing multiple file transfers without typing complete filenames, extensions and drive designations.

Minimum requirements include a CoCo 2 with 32K, Disk Extended BASIC and two disk drives. It will work on a CoCo 3, also.

The packaging and documentation, as I received it, is not very impressive. The disk label was handwritten, and the documentation consists of two sheets of paper printed on a draft-quality dot matrix printer. There is a phone number for technical assistance (*not* toll-free). I was, however, impressed with the software.

When run, the program calls up a main screen that includes a copyright notice, the instructions to enter END to quit, and a request for a filename to copy. You may, at this point, enter a complete filename, the first letter or couple of letters of a filename, or a period and extension. The disk of origin must be in Drive 0.

As the copying procedure progresses, the filename and extension of the files copied are displayed to the screen. All files on the disk in Drive 0 matching the specification you gave will be copied to the disk in Drive 1. If END was entered as a filename, the program stops and removes itself from memory to avoid conflict with any program you run later. Operation is simple and straightforward, so extensive documentation is not required.

As you can see, this is not a true "wildcard" copy, but it is close enough to do the trick. Over the years I have accumulated quite a few disks with all kinds of files scattered among them. I had lost control over the organization of my information! Using this utility, I am able to regain control without the formidable task of manually copying, one at a time, every file to a permanent home on a disk in a particular category. I can also make a backup of one disk on another without destroying the contents of the destination disk. In the future, keeping control will be much easier.

I found *Wildcard Copy* very useful after sessions on bulletin boards and information databanks such as Delphi. I no longer have to shuffle disks while downloading and saving the capture buffer. I can dump everything to one disk and then, after signing off, sort the files to other disks with this utility. Using the file extension parameter, I can quickly move BASIC programs to one disk and binary files to another. Text files are easily sorted by category (stock quotes, billing info, SIG messages, etc.) using the filename only.

I think most everyone could find many uses for this utility. Although the program does everything the author claims, and does it well, for its price ($15) I think a few more frills are warranted. There is no error-trapping. If the file already exists, the program stops with an AE Error message. If no files are found, the program flips to the main screen without any indication of the fact.

In all fairness to the author, I usually compose a wish list of features not included in the software I purchase. Modifying and adding to other people's programs has made me the software hacker I am today! *Wildcard Copy* is not copy-protected and is written in BASIC. Therefore, it should be easy to remedy most of my complaints.

Overall, I give the program a high rating. As it stands, my only objection is the price. I have seen similar programs advertised at slightly lower prices, but I've not tried them.

(RVC Software, P.O. Box 560, Englishtown, NJ 07726, 201-446-2033; $15: First product review for this company appearing in THE RAINBOW.)

— **William Baird**

Software CoCo 1, 2 & 3

The Lyra Lybrary — An Instant Repertoire for Your CoCo MIDI

The *Lyra Lybrary* collection is an 11-disk assortment of 230 music files that can be played by one or more MIDI synthesizers in conjunction with the Color Computer. Requirements include 64K ECB, a disk drive with Disk BASIC 1.0 or higher, a Y-cable or Multi-Pak Interface, a MIDI cable and a mouse or joystick. A CoCo-MIDI interface is supported but not required.

Lyra Lybrary songs can also be played, with some limitations, through any of the Multi-Pak synthesizer hardware modules available (such as Tandy's *Orchestra 90*), or even through the monitor speaker. But to take full advantage of the collection's features, a MIDI synthesizer with a minimum eight-voice multi-timbral capability is required and strongly recommended.

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synthesizer but have yet to create data files to hear it play? Or perhaps you don't have time to transcribe all the music you would like to work with? The *Lyra Lybrary* may have the ready-to-play music files you've been looking for. Featured on the disks is a wide variety of music transcriptions selected to appeal to many different tastes. Including the original three-disk *Lybrary*, now expanded with the addition of eight "supplement" disks, *Lyra Lybrary* has offerings from rock and popular songs to traditional and classical works.

All *Lyra Lybrary* selections were created by the *Lyra* music editor (also available from Rulaford Research). The user need only load a selected song file into *Lyra* and play it. Each song is a standard *Lyra* music file and can be modified by any of *Lyra*'s editing features. (The *Lybrary* is compatible with all versions of *Lyra*.)

If you don't have the *Lyra* editor, the songs can be played with a "jukebox" program (by *Lyra* author, Lester Hands) that is provided with each initial *Lybrary* purchase. With the jukebox, you can select a single file or a series of files and play them through one or more MIDI synthesizers.

There are also options for playing through other devices: the monitor speaker, *Symphony 12*, *Stereo Pak* and *Orchestra 90* (the last two playing in mono only). Again, only a MIDI synthesizer can make full use of the music files.

The *Lybrary* selections appear to have been put together with an emphasis on consistency and maximum compatibility. Most of the files have been transcribed for seven to eight voices. Each file has four of the voices highlighted so that a user with a single four-voice synthesizer can easily select the four most significant lines of music.

To further ease the program's use, the melody line on each file (with few exceptions) is played in MIDI Channel 1, *Lyra* Voice 1, while the bass line is in MIDI Channel 4, *Lyra* Voice 8. All the files have their instrument tables configured for the Casio CZ-230S. This seems to be a fairly popular four-voice synthesizer. There are also conventions for the eight-voice Yamaha FB-01. Documentation is provided that offers some general suggestions on getting the most out of your particular system.

My system consists of an eight-voice Yamaha TX81Z and a four- voice Casio CZ-101, so I needed to edit the instrument tables on each file before playing. It should be noted that because of the differences among various synthesizer models, you will more than likely need to make changes to each file's instrument configuration table and MIDI channels to get acceptable results.

The process of making these changes is straightforward, and, in fact, I found experimenting with different instruments one of the more enjoyable features of working with the *Lybrary*. Unfortunately, there is no global method for modifying all the music files on a disk; each file must be loaded from disk, modified and then resaved to disk to preserve the changes. It is, of course, recommended that only copies of the *Lybrary* disks be modified, while the originals are safely stored unaltered.

Each of the 11-disk set is filled nearly to capacity with music. Each disk "plays" for 40 to 80 minutes when run sequentially using *Lyra* or the jukebox. The different playing times are due to the files varying in tempo and complexity. Some of the files are quite large, requiring up to 11 granules of disk space each. Having spent many hours myself transcribing and debugging sheet music into *Lyra*, I can attest to the effort that went into these files. All of the transcriptions make use of specific instruments appropriate to each song, and many have velocity (volume) data for synthesizers that are velocity-sensitive.

On the whole, there seems to be a pervasive emphasis on pop, traditional and classical favorites, but the music does represent a variety of different musical periods and styles. One disk, for example, has mainly popular and show tunes, including such well-knowns as the Pink Panther and *Hawaii Five-O* themes. Another is a classical tour with selections by Bach, Debussy and Tchaikovsky. Other disks are mixtures, offering movie and Broadway themes from the '50s through the '80s, along with contemporary rock-and-roll. There is even a disk of Christmas music. The documentation lists the complete song titles and their composers in the order they appear on the disks. For a self-addressed stamped envelope, the author will send you a list of titles.

While there is a whole world of music waiting to be included in the *Lyra Lybrary*, overall there is a satisfying variety to this collection. This is all the more impressive because one industrious individual, Cecil Houk, is responsible for all the transcriptions. From Mozart and Beethoven to Irving Berlin and Henri Mancini to Phil Collins and Michael Jackson, there is a great deal of music here to explore and enjoy.

If you are considering whether or not ready-to-play music files would be of value to your CoCo MIDI setup, all I can offer is this MIDI user's experience: When I first put together my CoCo MIDI system, my interests were in transcribing personal musical favorites and in trying my hand (and ear) at some original composition. The last thing I expected was to be purchasing music ready to play — I didn't want my synthesizer to be a "player piano" for passive listening. But from the time I first experimented with the sample files that came with the *Lyra* editor, I discovered that I was not in a passive role at all. Suddenly I was a musical arranger and conductor, selecting instruments for this passage and that, picking up the tempo here and slowing it down there. I found myself actively participating in and learning about music I would have never sought out before.

Whether you purchase one disk or the whole set, I can strongly recommend *Lyra Lybrary* for your CoCo MIDI.

(Rulaford Research, P.O. Box 143, Imperial Beach, CA 92032, 619-690-3648; $14.95 per disk: First product review for this company appearing in THE RAINBOW.)

— Walter B. Myers

~~Software~~ CoCo 1, 2 & 3

Hall of the King Trilogy — In Quest of the Earthstone

Attention, Adventure fans! Now offered as a complete package are the *Hall of the King* programs: *Hall of the King*, *Hall of the King II: The Inner Chambers* and *Hall of the King III: The Earthstone Revealed*. These adventures are a pleasure to play. The graphics are sharp and the text is easy to read.

The locations range from rather stark and simple to charming and picturesque. In *The Earthstone Revealed*, the third installment of the trilogy, animation adds to the beautiful depiction of the countryside. (If you can't fix the bridge, at least you can admire the view.) The text, which appears below the graphics part of the screen in upper- and lowercase, is well done.

The scenario concerns dwarves who had to flee their mountain home, Firrest, after a natural disaster many years ago. You have been called upon to find the way into the mountain and recover the powerful Earthstone, which was left behind. Your journey is divided into the three programs, each of which can be played independently of the others.

The documentation is brief, but quite adequate, consisting of one mimeo sheet per Adventure. The sheet is packed along with the companion disk in a vinyl container for easy storage. The disks, guaranteed to work properly for one year, will be replaced if defective.

Each program is supplied on a flippy disk. During play, the Adventurer is prompted to "flip" the disk. Be sure to follow directions exactly. I did not find "flipping" especially inconvenient. The programs are copy-protected. In the first two games of the trilogy, though, it is possible to back up Side 2.

Hall of the King and *The Inner Chambers* allow only one "save" at a time, and on Side 1 you must choose your "save" location carefully. In *The Earthstone Revealed*, things are better: You can save 10 times on each side, but you must load on the correct side.

The documentation does not specify which model of the CoCo the trilogy should work with, or which Disk BASIC, but an earlier ad for *Hall of the King* does claim full compatibility with all CoCos. Of course, this trilogy was written before the CoCo 3 came out. I do not have a CoCo 3, so I was not able to check the program's operation on the newest CoCo. However, I would suspect that there might be color problems. It is always wise to mention which CoCo you have, along with the version of Disk BASIC it uses, when you order a piece of software.

As stated, the programs can be played in any order. I recommend that the background information be read at least once: It's not exactly the same for each game and may offer clues. The games get progressively longer and harder as you work along in the trilogy. I don't think a player must be an expert to win, but some previous Adventuring experience would help.

Some words in the vocabulary are given, but most must be discovered. Because the game is composed of interlocking programs, a command may work at one time and not at another. Also, some commands are shared by all three adventures. Others are unique. Pay close attention to the responses — acceptable commands have a definitive response. It is possible to "die," so do use your life*saver*.

Hall of the King, the first in the trilogy, takes you through the hall as you search for the first piece of the Earthstone. Clues are given and the solutions are all logical. An interesting poem will furnish more information about the quest. The beginner can find almost enough outside help in certain back issues of RAINBOW to win. Note I said *almost*. The player cannot exit the last room and win unless he or she is carrying all the required items.

The Inner Chambers continues from the "Hall" through the "Sea of Death" to the "Crypt." There are no clues in RAINBOW for this game, but those who pay close attention to both the pictures and the words won't need any. The trickiest part will be finding the map. You will need to learn when a trap is not a trap and when you should slip or slide. Every object has its uses, but you can carry only six items at a time. Choices, always choices!

The Earthstone Revealed takes you on the last lap, where you finally will find the Earthstone. The scenery is

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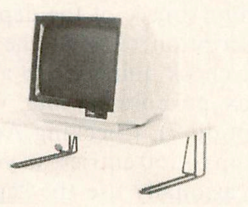

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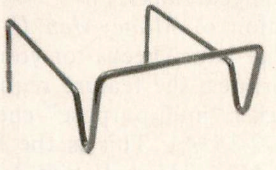

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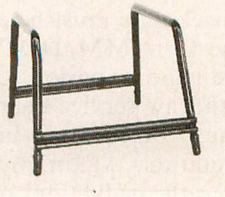

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moving. There is a new complication, *though* — it gets dark. In the earlier parts the action was aboveground, but here the action occurs deep inside the mountain. Most of the clues are clear, but some might be misleading and players may wish to have outside help. As in all good adventures, the command `EXAM` is very important and should be used repeatedly.

The author has done a fine job on the graphics, but is not devoted to beeps or proofreading. The programs work well with a minimum of delay. If you have 64K and a disk drive, the *Hall of the King Trilogy* is a good addition to your Adventure library.

(Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, 412-372-5674; $74.95 plus $2.50 S/H)

— Audrey De Lisle

Software CoCo 1, 2 & 3

MoneyMan II — Refinance Yourself

Tired of wrestling with your budget? Does getting your checkbook to balance seem a statistical improbability? Tired of being body-slammed by good old Form 1040? If your answer to any of these questions is yes, then you should consider picking up a copy of Tothian Software's *MoneyMan II.*

MoneyMan II consists of a set of seven 32K ECB programs designed to perform most household financial chores. It is a disk-based, menu-driven program with limited interactive capabilities, which is to say that some of the programs generate data useful to some of the other programs.

In all of the seven programs, the information generated may be sent to either the CoCo's screen or to the printer. The use of a data disk is supported and certainly required if continual updating of your personal financial status is to be accomplished. This program can even write your checks. But to see if *MoneyMan II* is worth its $24.95 price tag, we should take a close look at its specific functions.

Option 1: Savings Planner

This section of *MoneyMan II* will work out various types of compound interest problems as they relate to different types of savings plans. A wide range of possibilities in the way of interest rates, compounding periods, terms of the plan, etc., are allowed for.

The Savings Planner basically breaks down into two parts. The first five options of Savings Planner will allow you to find the starting principal, total future principal, yearly interest rate required, amount of time required, or total amount of interest earned. You can find any one of the above by inputting the other four.

The second part of Savings Planner can help you create a periodic savings plan tailored to your needs. You can do this by inputting various figures for the amount of your periodic deposit, the number of years money is deposited and the rate of interest paid. The program will then tell you the total amount accrued. The second portion of Savings Planner could be particularly useful in setting up an IRA, tax-deferred annuity or similar plan.

Option 2: Loan Planner

After you input the total amount borrowed, the number of payments per year and the annual percentage rate, Loan Planner will calculate either the required term of the note, the amount of each payment, or the amount of the balloon payment (this, of course, may be deleted), with any two of the three variables known. I personally found Loan Planner to be quite useful as I am currently contemplating the purchase of some real estate. Its ability to quickly figure my monthly liability came in quite handy.

Loan Planner will also tell you the total amount repaid — which, as anyone who has calculated compound interest can tell you — is usually quite a staggering figure. But the same people will also heartily concur that the first two options of *MoneyMan II* make short work of the normally arduous task of compound interest calculations.

Option 3: Budget Planner

If you are one of those folks who has trouble living within a budget, this portion of *MoneyMan II* could well be worth the purchase price by itself. With this option you can create and categorize a monthly budget. It will allow up to 25 categories (such as transportation, food, shelter, etc.) Within each category there is an allotted amount and the actual amount spent.

Taking into consideration the fact that these two figures will rarely if ever match, Budget Planner also includes a carryover feature. So the difference between the allotted amount and the actual amount spent, whether you overspent or underspent, can be carried over to the next month.

This carryover feature — aside from dealing with financial realities — can also be used to bring your allotted and actual figures more into line with each other. Of course, to keep the monthly budget updated and edited, abilities for hard copy output and saving to disk are required. No problem. The folks at Tothian Software included these functions very nicely into the program's layout. So once your budget has been initially created, it requires only updating, editing and self-discipline to stick with it to keep your budget effective.

Option 4: Checking Account

Checking Account is basically an electronic checkbook. However, your willingness to use this portion of the program will determine to a large degree just how useful *MoneyMan II* will be to you. This is because two of the remaining options in the program are totally dependent on the data files generated by Checking Account.

Using this option requires that you enter in a starting balance (this really should be a balance reconciled from your bank statement, or your initial starting balance when you opened the account), the date of the check or deposit, the party to whom the check was written or source of the deposit, a general description of what the check was for, the check number and a check code for tax purposes (which will be used by Option 7). Checking Account can handle up to 150 entries, so you will have to occasionally use the "create a new account" feature even though you have not changed banks.

This portion of *MoneyMan II* can actually write your checks for you on your line printer; the feature requires Radio Shack's "multipurpose" checks (Cat. No. 72-153A). This is the first portion of *MoneyMan II* that I feel needs improvement. First, a minor point: The check date must be entered exactly in the form MM/DD/YYYY. Second, there is no provision to automatically withdraw service charges or add in money for interest-bearing checking accounts. Again, this is a minor point, as the deductions or credits can easily be entered manually. With the plethora of different types of checking accounts available, it was probably in Tothian's best interest to leave these entries manual.

Option 5: Savings Account

Savings Account is an electronic passbook that resembles Option 4 in commands and features. Once you have used Option 4 you will certainly have no difficulties with Option 5. But again a flaw, and this one would have been easy to fix: There is no provision for automatically adding interest. Savings account interest (unlike checking account charges and credits) is fairly straightforward, and I feel this feature would have enhanced an otherwise complete home financial package. But, once again, this information can be entered manually.

Option 6: Reconcile Bank Statement

Of all the possible household financial jobs, probably the most tedious has got to be reconciling the bank statement with the checkbook. The basic problem with this is checks never clear at the bank in anything like the order you wrote them. The Reconcile Bank Statement portion of *MoneyMan II*, when properly used, will make this task easy.

However, this option is totally dependent upon the data files generated by options 4 or 5 and the type of file to be used (correlating to whether you are reconciling checking or savings statements). Remember when I stated that your starting balance on options 4 and 5 should be a balance reconciled with your bank statement or your initial starting balance? This is, of course, so that the reconciled balances generated by this option will be accurate. Using the option basically consists of going through the appropriate file and marking the checks, deposits and withdrawals that have cleared the bank. Once this is complete, you can balance and reconcile. Your reconciled balance should match the balance on your bank statement. If it doesn't, the real fun begins and you must start looking for an entry error — or a bank error.

Option 7: Summarize Deductibles

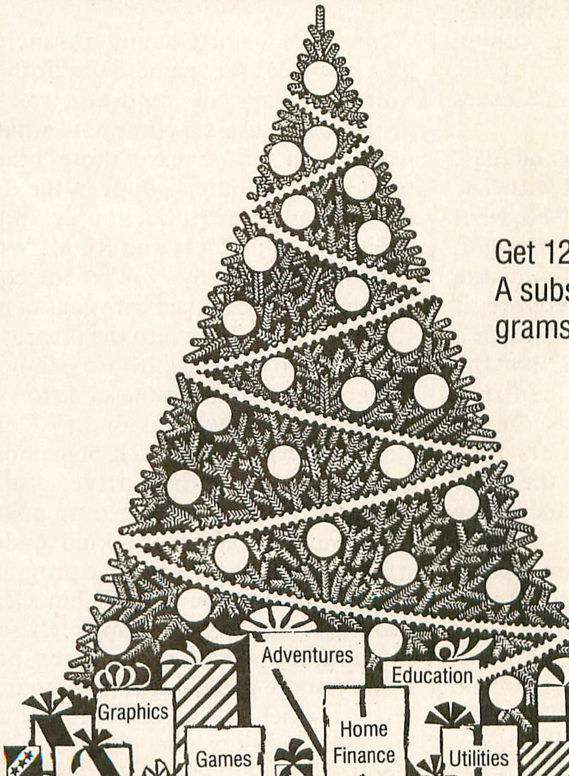
This can be a very handy little option. Again, it is dependent upon the data files created by Checking Account and Savings Account. It was for this part of the program that you input tax codes of the checking and savings options. The tax code numbers are assigned to payments that you want to use as write-offs on your income tax. Summarize Deductibles will read the data files and collect, sort and add the entries that have been given a tax code number. There are nine user-definable tax code numbers available. This option also includes "memory jogs" that remind you of what each tax code represents — much preferable to leafing through your check ledger at tax time.

Options 8 and 9

Option 8 is to assign drive priority for two-drive systems in regard to the data and master disks. Option 9 simply allows you to exit the program.

All in all, I feel that *MoneyMan II* represents good value for your 25 bucks if you have the willingness to use it properly. It requires 32K and a disk drive, and it supports two-drive systems and printers for hard copy. It ran without any problems on my setup. Sample data files are included on the master disk to get you up and running as soon as possible, and the documentation is most adequate. There are excellent failsafes built into the program. Despite multiple intentional errors, the only error I could create involving a loss of data was to send output to the printer without having the printer hooked up.

Having been in retail for 13 years, and, being somewhat mathematically gifted, I may have moved past the point



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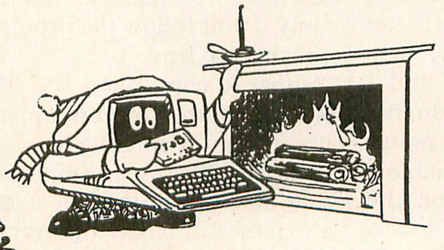

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where *MoneyMan II* could really make a major difference in my personal financial dealings. But believe me, I can still appreciate its finer points, such as its Loan Planner, Reconcile Bank Statement and Summarize Deductibles options. In fact, I am currently planning on using Checking Account just to use the latter two options. These are very useful utilities that can save you an enormous amount of time. And, after all, in the final analysis, isn't that what computers are supposed to do?

(Tothian Software, Inc., Box 663, Rimersburg, PA 16248, $24.95)

— James C. Hinton

Software OS-9

The Zapper — Disk Editing by the Numbers

The Zapper, a utility that may be used with OS-9 Level I and II, allows the user to edit an entire disk or a single file. If you're a newcomer to the OS-9 system, *beware*! Using this program could be hazardous to your disks. The manual warns you, and I will, too — an entire disk could be rendered totally useless if this program is used incorrectly.

The first course of action is to make an executable backup, which will become the working disk. According to your operating configuration, you put a copy of *Zapper* in your execution directory (probably the `CMDS` directory).

You have a choice of an 80-column or 32-column screen. The 80-column screen is for use on an OS-9 Level II system, and the 32-column screen can be used on either Level I or II. My system operates under Level II, and I tried both screen versions. Although I use a 13-inch TV for a monitor, I prefer the 80-column version; it is still readable and displays an entire sector on the screen. The 32-column version displays only a quarter of a sector at a time.

For those of you who are like me and dig in as soon as you open the package, let me offer a word of advice. Before even attempting to try to edit a disk or a file, it would be a very good idea to back up the disk to be edited or to copy the file to another disk. Destroying data is a possibility.

Executing this program is simple. With *Zapper* in your execution directory, just type `ZAPPER`, followed by either a drive name (i.e., `/D1`) or a filename, with or without a path name. The program loads and a simple title screen appears. Next comes the display.

When you are editing a disk, you will see a title bar at the top of the screen with the following information: logical sector (current sector), track, sector and numeric mode. The logical sector gives your location on the disk or in a file. The numeric mode is for input on the command line and is available in hexadecimal, decimal or octal. It does not affect the sector display, which is always shown in hexadecimal. The rest of the display consists of three parts: the hex section, the ASCII section and the command line.

Moving through the sectors is accomplished by using the arrow keys. When you find a sector you want to edit, pressing the E key will move the cursor from the command line to the hex section. You can edit the sector by changing the hexadecimal numbers or moving over to the ASCII section and replacing the text. When you are finished with that sector, pressing ENTER will open an overlay window that prompts you to rewrite the section. Answering the prompt by pressing the Y key rewrites the sector, making the change permanent. Answering with an N deletes the changes, restores the display to its original state and leaves the sector unchanged.

And how about those command files? Sure, patching command files with *The Zapper* is another possibility. Well, what about the CRC, you ask? You're right. After patching a command file, the CRC will not be correct. Therefore, if you try to load a command file with a bad CRC, OS-9 will not allow the module into memory. Can it be fixed? Only if you follow the prompts. On the command line, press C. This tells *Zapper* to check the CRC. If the CRC is bad, another prompt appears asking if you want it corrected.

Saving files is an important option that allows you to save a sector to an altogether different file. Pressing S on the command line will display a prompt asking for a filename. Enter a filename and *Zapper* will create a new file on the disk. If you enter a complete path name, you may save the new file to another disk. If the file already exists, then the sector will be appended to the end of the existing file.

Would you like to hear about one of the better uses of this utility? How about recovering lost files? Just edit the disk, save it sector by sector, exit, then edit the file to remove any unwanted garbage. You may not be able to get all the lost information, but it beats losing the data altogether.

Zapper's manual outlines the commands, explaining how to back up, load and run the program. A newcomer to OS-9 will probably have difficulties with this utility. The manual's explanations will most likely require an intermediate understanding of OS-9.

When you're finished and ready to move on to something else, don't look at the manual for instructions on exiting. I found the "exit" key by experimenting. Pressing the Q key deposits you at the OS-9 prompt.

(Alpha Software Technologies, 2810 Buffon St., Chalmette, LA 70043, 601-266-2733; $19.95)

— Greg Snow

Software CoCo 1, 2 & 3

Bug Buster 2000 — Zapping Bugs From Your System

Since the Color Computer is incredibly bug-free, this game from Tothian Software plays an important role in giving CoCo users a glimpse of what it would be like to use one of those "other" brands of computers. Bugs in the disk drive, bugs in the power supply, in the printer, even in RAM and ROM! What a mess! Fortunately, you're not completely helpless. Armed with cans of bug spray, you can delve into the innards of your system and blast those annoying critters before they do the same to you.

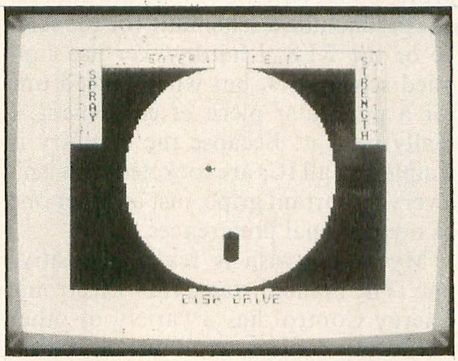
Bug Buster 2000 runs on any Color Computer with at least 32K of memory, a joystick and a disk drive, and it supports the standard speed-up pokes. I had no trouble of any kind understanding, loading or using the program. The documentation is brief but clear, and the screen menu is completely self-explanatory. Upon running the program you are greeted with a "scenario" screen, which explains your predicament and presents a delightful close-up picture of the dreaded *bug*.

Achieving a high score is not as easy as using the package, however. You can choose at the menu which of the five areas of the computer you want to debug (disk drive, RAM, ROM, power supply or printer). Pressing the firebutton on the joystick advances you to the next area by default.

Maneuvering your spray canister, you attempt to nail the elusive bugs while avoiding an often intense barrage of cross fire. Each of the five areas has its own screen configuration, and strategies that seem to work in one area will fail miserably in the next. I managed to find a workable method for RAM and ROM but am still struggling with the printer and disk drive!

I was pleasantly surprised to find that selecting the speed-up poke option on the menu does more than simply make things move quicker. It actually changes the nature of the game. At normal speed, *Bug Buster 2000* is lively and fun, but slow enough to allow a bit of strategic thinking. At high speed, you toss strategy out the window and hone your reflexes! I had enormous fun alternating between modes, feeling almost as though I were playing two different games.

As with most video games, accomplishing the stated objective does not result in victory but in an increasingly difficult objective. Once you manage to clean out all the bugs in your system, you are rewarded with a new infestation — with faster, more numerous bugs. You do get more points for blasting them, but they defend themselves much more efficiently! The program enables you to keep a permanent record on disk of your 10 highest scores.



Bug Buster 2000 is great fun, and I recommend it to any video game enthusiast who wants to try to clean out a bug-ridden computer system. Or, I suppose, you could go buy a Commodore . . . .

(Tothian Software, Box 663, Rimersburg, PA 16248; $19.95)

— Jim K. Issel

Hardware

AR-16 Relay Interface and RI-8 Relay Card — Hardware for Controlling External Devices

If you've ever wanted to use your CoCo to control things in the real world but had trouble following how-to articles for building the necessary interfacing circuitry, you should look into some hardware from Electronics Energy Control.

I just spent some time experimenting with two of their products that simplify controlling electrical devices from a CoCo. The main unit is the AR-16 Relay Interface. This unit connects to the CoCo's serial port and directly controls up to 16 devices. If control over 16 devices is not enough for the job you have in mind, the AR-16 can be connected to expansion cards, allowing control of up to 128 devices. The AR-

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16 is designed to control relays, which can be used to control anything that doesn't exceed their electrical ratings.

The unit I received included one RI-8 relay card with eight relays and all relay interfacing circuitry. The relays on this card are output-rated for 3 amperes at 125 volts and can be used to control household lights, appliances and other devices. Other relay cards are available from Electronic Energy Control for those with different needs. Two relay cards can be connected directly to the AR-16 for a total of 16 relays under the CoCo's control without the need of an expansion card.

The AR-16 is controlled by any RS-232 port, including (but not limited to) the printer port built into the CoCo. The instructions detail how to connect the AR-16 to a standard RS-232 port such as a Deluxe RS-232 Program Pak or the serial port of another computer. This makes the AR-16 a good investment for those with access to several computers or those looking forward to purchasing another computer. For many of us, this may be just the thing for returning that retired CoCo 1 or MC-10 to productive service.

Both devices are well-designed, professionally constructed and durable-looking. I especially appreciate the fact that input, output and power connectors are of sturdy screw design. Both units appear to be "industrial strength" — an important point considering the amount of connecting and reconnecting they'll have to withstand at the hands of the experimenters.

The instructions included with the AR-16 are terse but complete. The seven-page manual lists all specifications and pinouts for the input, power and relay connectors. A driver circuit is included for those wanting to build their own relay boards. Radio Shack part numbers are supplied for all parts in the relay driver circuit as well as for the required power supply. This helps those of us who don't have access to other sources of electronic parts.

The AR-16 is easy to program. Relays are controlled by sending characters out through the serial port. The instructions include a very simple program for controlling the relays. I would like to have more complete examples included, but the AR-16 is so easy to program that even a beginner should have no trouble building on the information supplied. Electronic Energy Control will supply control software for a small fee to those who don't want to write their own.

I do have a couple of comments about the system — sort of a wish list. First, a case, which the AR-16 requires. You can easily build one, but a custom case would be helpful. Several sizes would probably be needed to accommodate different relay card combinations. Maybe this is impractical, but I like professional cases. Second, the manual doesn't include a schematic for the AR-16 or the RI-8. I hardly ever use supplied schematics, but when I need one for a particular piece of equipment, I really need it! Because the circuitry is simple and all ICs are socketed, this isn't a very important gripe, just another one of my personal preferences.

My major wish is really a positive one. The manual states that Electronic Energy Control has a variety of other hardware devices available and that they have several stock control programs available for the AR-16. This interested me enough that I wish they had included a catalog along with their manual. When this is your major complaint, you're dealing with quite a company.

The AR-16 and RI-8 aren't for everybody. They won't sell as well as inexpensive game software. Those who want or need these types of devices know who they are. If you're one of them, I strongly suggest that you contact Electronic Energy Control for more information. It could save you a great deal of time.

(Electronic Energy Control, Inc., 380 S. Fifth St., Suite 604, Columbus, OH 43215, 614-464-4470; $89.95 for AR-16, $79.95 for RI-8: First product review for this company appearing in RAINBOW)

— Donald L. McGarry

Software CoCo 1, 2 & 3

The Entertainer — A Collection of Puzzles and Games

The Entertainer consists of a set of 12 programs — puzzles, brain-teasers, games of chance and feats of magic — that will provide you with some light moments of fun and games. The Hi-Res programs are written for the 64K CoCo 1 and 2 and come on a single nonprotected disk.

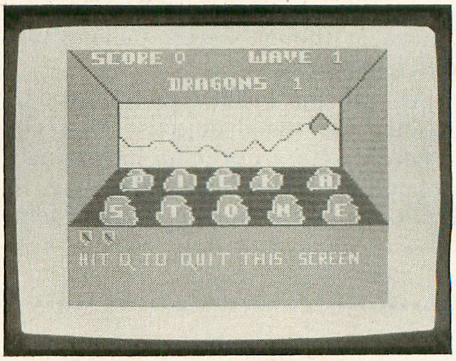
A menu is booted by entering `RUN "BOOT"`. You use the up and down arrow keys to select the program of your choice and press ENTER to execute it. When you are finished with one game, run `BOOT` again to select another.

Mark 7 is a challenging puzzle in which you must select the starting and stopping points on a star. Although it's simple to solve for five points, the real challenge is to get to seven.

Mark 9 is like *Mark 7*, but here the ultimate goal is to cover nine circles. This is a real brain-buster.

Cliche is a word puzzle in which you must find a saying, phrase or cliche that is represented in each box shown on the screen. You have seen these before: Picture the word *working* drawn over the word *time* and you come up with *working overtime*.

Symbols is a series of symbols or letters shown in such a way as to create a humorous phrase. You try to guess what the phrase is, then press C to view the answer and continue.



Magic consists of three puzzles in which you pick a number or a card and the computer prompts you through various steps to come up with an answer. This one is based on some age-old number games and card tricks, and it is fun to watch your CoCo do the magic.

Memory starts off easy but really gets tough as you try to key in the ever-growing number sequences. Ten numbers are about my limit.

Nibbles draws a four-by-four grid filled with 0s and 1s. You try to memorize their positions and fill in the grid after the computer blanks them out. Incorrect answers are shown in red. I never did advance to the succeeding grid!

In *Sequence* you are given a sequence of numbers and must then fill in the next logical number that follows. This one is fun and challenges your math instincts.

In *Mad Libs*, the computer will ask you for various nouns and other parts of speech. CoCo then prints out a number of hilarious paragraphs. The more unusual your inputs, the more bizarre the results!

Not One is a challenging dice game in which you try to beat the computer at its own game. After rolling two dice, the challenge is to not repeat the first roll. Your score is based on the value of the dice. I beat the computer several times on this one.

In *St. George & the Dragon*, 10 rocks are shown on the screen and each bears a letter. The challenge is to uncover each rock without uncovering the dragon. You accumulate gold pieces, but the trick is knowing when to stop. The longer you play, the greater the chance that you'll uncover a dragon. This one is fun, but I am entirely too greedy!

Mill is a two-player game in which each player takes a turn in placing nine chips on the playing board. As soon as a player gets his mill, he may remove one of his opponent's chips that has not formed a mill. This one is fun, and the playing board seems 3-D.

The Entertainer package is bargain-basement-priced, and each game is fun. I spent a challenging and fun-filled evening with it. I believe you will, too.

(Aftamonow Software, 46 Howe St., Milford, CT 06460, 203-878-3602; $10: First product review for this company appearing in RAINBOW.)

— Jerry Semones

Software CoCo 1 & 2

Adventure in Lumeria — King William Takes a Wife

There you are, King William, just sitting on your throne in Templeton. As luck (?) would have it, you receive news that the princess of Lumeria has been kidnapped by an evil count. Her royal father doesn't have enough money to pay the ransom. Because Lumeria just happens to lie on the other side of the mountains of Templeton (remember them from *Quest for the Ring*?), you decide to embark on another adventure. At the least it will take your mind off your loneliness — and, hey, a princess is a princess, right?

Adventure in Lumeria is a graphics Adventure game, and you begin by standing in a field on the Lumerian side of the mountain. You'll wander around fields, caverns and underground rivers trying to find and rescue the princess.

If you've already solved *Labyrinth* and *Quest for the Ring* (the first two programs of this trilogy), you'll have an advantage — knowing how the author's mind works. Just to make things more interesting, though, Lumeria has more graphics screens, a larger vocabulary (there are even some three-syllable words!), reincarnation and "quit" features, and some living things to help you.

Those of you who are "baby boomer" age will remember at least the tune, if not the title, of the song that plays during the start-up screen. You'll also recognize another song that plays during the Adventure. You may even find yourself humming it long after you turn the computer off.

I was impressed with the Hi-Res graphics in this game. The outdoor scenes are drawn in perspective, so that the closer you get to a mountain or pond, the larger it appears. The indoor scenes are quite detailed and I enjoyed looking at the pictures as much as I did playing the game. (By the way, the princess ain't half bad herself!).

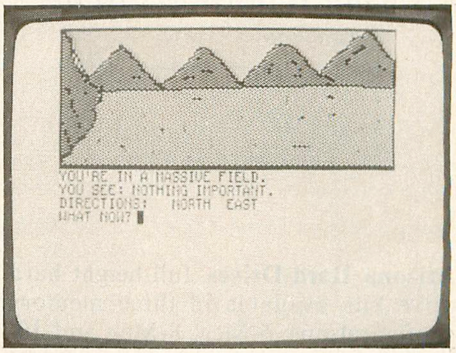
There is no game save feature. If you get tired of playing, you can "Quit," which will simply end the game. When you quit, the program asks if you want to "reincarnate." I found "reincarnation" to be a really handy feature; you end up back at the beginning of the game, *but* you find yourself equipped with all the objects you had when you quit. You can also reincarnate if you happen to die prematurely. Reincarnation saves you the time and trouble of having to go back to every single place you've already been — it should be a required feature on *all* games!

A couple of other improvements in the commands are worth mentioning. You need only type `INV` instead of the old `USE INV` for inventory. Also, typing `LOOK` provides a scene description.

There isn't any formal `HELP` command. Help comes from examining the objects and living things you run across. (*What* is an Indian doing camped in the middle of the kingdom?!)

You can check your progress with the `SCORE` command. A perfect score is 504, and each object is worth 36 points, so you can figure out how many objects there are to find. Of course, after you find that last object, you still have to rescue the princess.

Even though *Adventure in Lumeria* is the final installment of a trilogy, it is also a stand-alone game. It is designed to run on a 64K Disk Extended BASIC CoCo 1 or 2. This two-disk program will run on either a one- or two-drive system, but with a single drive you do have to switch disks occasionally. I reviewed the game on a CoCo 2 (F board), then I commandeered a CoCo 1 (E board with capabilities of both DOS 1.0 and 1.1) from someone in a local users group. It worked fine on the CoCo 1 E board in DOS 1.1, but not while in DOS 1.0.



```
YOU'RE IN A MASSIVE FIELD.
YOU SEE: NOTHING IMPORTANT.
DIRECTIONS:   NORTH  EAST
WHAT NOW? █
```

RTB Software guarantees all its software to load. If for some reason it doesn't, just return it for a free replacement. I found the company to be very helpful in all aspects, and a real pleasure to work with.

Adventure in Lumeria is an entertaining game, no matter what your age or level of Adventuring. If you're skilled at solving the more complicated games that require "illogical" reasoning, you'll find this game to be a relaxing diversion. Younger and beginning Adventurers won't get so frustrated that they'll want to throw the computer. The entire game will hold your interest, as well as that of any spectators who happen to wander by while you're playing.

At $36.95 (a $2 increase over *Quest for the Ring*), you get plenty of value for your money due to the increased difficulty, additional screens and added commands. This game has sound, graphics and adventure, and I'd recommend it — and the entire trilogy — to anyone. I'm hoping King William and his bride will have some little King Williams who will start another trilogy, but instead I hear that RTB has yet another game in the making. I can't wait!

(RTB Software, P.O. Box 777, West Acton, MA 01720, 508-263-0563; $36.95 plus $3 S/H)

— Gail Allore

Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

Arizona Hard Drives, full-height hard drive kits available in three memory configurations: 5-Meg, 8-Meg and 10-Meg. Each comes with drive, SASI controller, power supply and cables. Buyers supply the case and the interface. A Disto hard drive interface is available for $50 with purchase. (Arizona also offers a club deal of $389 for 20-Meg drives.) *Arizona Small Computer Peripherals, 930 W. 23rd St., Suite 26, Tempe, AZ 85282, (602) 829-8028; $120 for 5-Meg, $140 for 8-Meg, $160 for 10-Meg.*

◆ **Buried Buxx**, an arcade game in which you must shoot holes in the ground to uncover the "buried buxx" and then descend into the holes to retrieve it, avoiding falling bombs all the while. For 32K ECB CoCos 1, 2 and 3; requires disk drive and a joystick. *Jr. & Jr. Softstuff, P.O. Box 118, Lompoc, CA 93438, (805) 735-3889; $19.95 plus $3 S/H.*

◆ **DiskEase**, a menu-driven CoCo 3 disk utility designed to "assist you in maintaining a perfectly groomed software library." It supports Disk BASIC and offers the following commands: `All`, `Drive`, `Copy`, `Kill`, `Name`, `Read`, `Run`, `Map`, `Backup`, `Restore` and `Quit`. Two disk drives are required for the copying procedures. *Jr. & Jr. Softstuff, P.O. Box 118, Lompoc, CA 93438, (805) 735-3889; $24.95 plus $3 S/H.*

Diskman II, an upgrade of the *Diskman* utility, featuring machine language coding and support for speed-up pokes and multiple drives. Options include examining or changing a sector, checking readability of disk granules, and backing up, restoring, reorganizing and alphabetizing directories. Included is a companion program called *FileCopy*, which assists in reviving files unreadable due to I/O Errors. For the CoCo 1, 2 and 3. *Tothian Software, Box 663, Rimersburg, PA 16248; $24.95.*

Disto Super Controller, a floppy drive controller that comes with C-DOS. Users can plug EPROMs and "Disto Super Add-Ons" into an internal mini-expansion slot. *CRC Computers, Inc., 10802 Lajeunesse, Montreal, PQ, Canada H3L 2E8, (514) 383-5293; $99.95 US.*

Disto Super Controller II, a Tandy-compatible floppy drive controller that works with all CoCos and the Multi-Pak Interface. It features an internal 17-pin mini-expansion bus and gold-plated edge connectors. There are two modes of operation: "normal" (the default mode on power-up, compatible with the Super Controller I and the Tandy controller) and "buffered" (in which all sector reading and writing is done via a sector buffer). Under OS-9 it allows interrupt-driven operation for multitasking. *CRC Computers, Inc., 10802 Lajeunesse, Montreal, PQ, Canada H3L 2E8, (514) 383-5293; $130.95 U.S.*

FB-01 Calc, a program designed to simplify the operation and understanding of the FB-01 Sound Generator in conjunction with the *Lyra* music editor. *FB-01 C* allows you to have the same control of the FB-01 from *Lyra* as you would from the Generator's pushbuttons. Requires FB-01 and Version 2.52 or higher of *Lyra. Rulaford Research, P.O. Box 143, Imperial Beach, CA 92032, (619) 690-3648; $19.95.*

GFL Championship Football II, a football game that gives you two views of the field — one from overhead and one through the eyes of the quarterback. In addition to playing the part of the quarterback, you also draft the players and play coach, calling all the offensive plays. A glossary of football terms is supplied. On a ROM pack for the CoCo 3, joystick required. *Gamestar, marketed by Tandy; $29.95: Available in Radio Shack stores nationwide.*

L1+L2 Combination Pak, a collection of utilities/commands for OS-9 levels I and II that includes the following: `FixCRC`, `Grep`, `Info`, `Clone`, `DumpMem`, `ImageCopy`, `MacGen` (generates macros), `CP` (copies files) and `DL` (deletes files). Note: Some utilities/commands are for use with the CoCo 3 and OS-9 Level II only. *D.P. Microcomputer Consulting, 7655 SW Cedarcrest St., Portland, OR 97223, (503) 244-8152; $75.*

Lyra Lybrary Disks 12 and 13, two additional disks of synthesized music for the *Lyra Lybrary* collection. Requires 64K, CoCo MIDI and a synthesizer. *Rulaford Research, P.O. Box 143, Imperial Beach, CA 92032, (619) 690-3648; $14.95 each.*

◆ **Maestro Disk Editor**, a disk editor that features its own software-driven, Hi-Res 256-character ASCII set (128 unique characters) with true lowercase. It features four-directional cursor control, optional key click and support of 40-track drives under *ADOS* and 80-

track drives under *ADOS3*. It offers 32 editing commands, including `COPY`, `VERIFY` and `SEARCH`, and can examine disks configured under OS-9. *Marc Campbell Innovations, 266 Riverview Drive, Ephrata, PA 17522, (717) 733-2998; $16.95 plus $2 S/H.*

Max-10, a menu-driven WYSIWYG word processor that can incorporate text and graphics. Features include a spelling checker, multiple column capability, online dictionary, 20 fonts, cut-and-paste capability, type-ahead buffer, 512K memory support, screen preview, word counts and ASCII output and compatibility. Requires a CoCo 3, at least one disk drive and a joystick or mouse; supports these printers: IBM/Epson, DMP-105, DMP-106, DMP-130, CGP-220 and Gemini/Star. *Colorware, 242 West Ave., Darien CT 06820, (203) 656-1806; $79.95 —* CoCo Max III *owners get a $10 discount.*

Mini EPROM Programmer, an EPROM programmer that attaches directly to any Disto Super Controller or MEB adapter (a stand-alone expansion bus) and to three 9-volt batteries. *CRC Computers, Inc., 10802 Lajeunesse, Montreal, PQ, Canada H3L 2E8, (514) 383-5293; $54.95 US.*

Project Board, a "blank" board with gold-plated edge connectors ready for experimentation. *CRC Computers, Inc., 10802 Lajeunesse, Montreal, PQ, Canada H3L 2E8, (514) 383-5293; $12.50 US.*

Rad Warrior, an arcade game set in 3088 A.D. It is up to you, Tal, to save humanity from alien invaders who have ravaged the planet and enslaved the survivors. In order to do battle with the jugoids, subtairs, sloths and bomber droids, you must travel to the ruined city and find the fabled anti-radiation suit. On a ROM pack for the the CoCo 3. *Epyx, marketed by Tandy; $29.95: Available in Radio Shack stores nationwide.*

RGB-Mono Video & Audio Interface, an interface that converts the CoCo 3's RGB output for monochrome monitors, resulting in better-than-composite resolution. A speaker with volume control is included. *CRC Computers, Inc., 10802 Lajeunesse, Montreal, PQ, Canada H3L 2E8, (514) 383-5293; $29.95 US.*

RS-232 SuperPack, a stand-alone adapter that gives CoCoists RS-232 serial ports. It is compatible with OS-9's ACIA software and software for the Deluxe RS-232 Pack. A DB-25 cable is included. *CRC Computers, Inc., 10802 Lajeunesse, Montreal, PQ, Canada H3L 2E8, (514) 383-5293; $49.95.*

RS-232 Switcher, a three-position switch for switching among RS-232 devices. *CRC Computers, Inc., 10802 Lajeunesse, Montreal, PQ, Canada H3L 2E8, (514) 383-5293; $19.95 US.*

SolidDrive, a battery-backed, static RAM disk that write-protects itself and saves data on interruption of the power supply. It comes with an OS-9 Level I or II device driver; a Disk BASIC driver is available that treats the unit as three or six SSDD devices. Requires a Multi-Pak. *Vidicom Corporation, 20 E. Main St., Suite 710, Mesa, AZ 85201, (602) 827-0107; $695 for 1-Meg version, $395 for 512K.*

Super Pitfall, another mission for Pitfall Harry that has him hopping and swimming his way through a maze of five underground caverns. In this game he must "recover the priceless Raj diamond from a vast subterranean dwelling high in the Andes mountains." He must also rescue his beloved Rhonda and a feline friend, Quickclaw. Harry is menaced by frogs, spiders, scorpions, vultures, snakes and lizardmen. On a ROM pack for the CoCo 3; joystick optional. Programmed by Steve Bjork. *Activision, marketed by Tandy; $29.95: Available in Radio Shack stores nationwide.*

Synlib 1.31, a multi-instrument, menu-driven MIDI librarian that has the capability of sending and receiving MIDI "system exclusive" information to and from a variety of synthesizers. For the CoCos 1, 2 and 3. *Intercomp Sound, 129 Loyalist Ave., Rochester, NY 14624, (716) 247-8056; $95.*

Warrior King, a machine language game in which you, Rastann, Warrior King of Aqualore, must recover your stolen crown from Faerendor, land of a thousand castles, if you want to retain control of your kingdom. You will travel through dungeons and wilderness, with a sword as your weapon. Requires a CoCo 3, disk drive and a joystick. The program uses 320-by-200, 16-color graphics. *Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, (412) 372-5674; $29.95.*

Window Master, a point-and-click graphics operating environment for the 512K CoCo 3 and Disk BASIC, featuring "Window BASIC," which adds 50 new commands. It automatically installs two RAM disks as drives 4 and 5, and it uses either 320-by-225 resolution with 16 colors or 640-by-225 resolution with four colors. "Almost all normal Disk BASIC commands are supported, except for Lo-Res graphics commands and cassette I/O." Requires Hi-Res adapter with mouse or joystick. *Cer-Comp, 5566 Ricochet Ave., Las Vegas, NV 89110, (702) 452-0632; $69.95 plus $3 S/H.*

Word Power 3.2, an upgrade to the *Word Power* word processor for the CoCo 3. Features include 80-column display, windows, menu-driven operation, split-screen editing, mail merge, a pop-up calculator, a print spooler, spelling and punctuation checkers, two-column printing and support for 72K or 128K systems and 450K on 512K. *Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, (800) 654-5244; $79.95.*

◆ =First product received

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Lauren Willoughby

BASICally Q&A Speaking

By Bill Bernico
Rainbow Contributing Editor

Repeat After Me

Dear Bill:

I'm writing a program that features a moving cursor on the screen. In my program, you must press the arrow keys to make a cursor move one space up, down, right or left. It works great, but I would like to make the cursor movement automatic by holding down a key rather than repeatedly pressing the key. Can you help?

David Seefeld
Ames, Iowa

I know of two procedures that will make your program slicker. Both procedures involve poking values into memory so that the computer will do something it wouldn't normally do. To get the `INKEY$` function to repeat itself, you'll have to do something like this:

```
10 CLS
20 A$=INKEY$:IF A$=""THEN 20
30 FOR X=338 TO 345:POKE X,255:
NEXT X
40 PRINT A$;
50 GOTO 20
```

Without Line 30, the `INKEY$` function will work as usual. That is, you'll have to press a key over and over to get results. Line 30 tricks the computer into thinking that the key has been pressed again for as long as you hold it down. If you press the key very quickly and let it up again, you can display just one character, but the repeat feature is almost immediate.

The second procedure also involves poking values *before* the `INKEY$` command. The routine looks like this:

```
10 CLS
20 POKE 341,255:POKE 342,255
30 A$=INKEY$:IF A$=""THEN 20
40 PRINT A$;
50 GOTO 30
```

Notice that Line 30 goes to Line 20 instead of the `INKEY$` command in Line 30. You must poke those values each time you want the key press to repeat. If you incorporate these techniques into a graphics program, you can get a gun to shoot repeatedly, move your cursor around on the screen, etc.

Follow the Bouncing Arrow

Dear Bill:

I'm just starting out with my CoCo. (I've had it only three months, but I'm already addicted.) I've seen a few programs that have objects moving around on the graphics screen. It looks awfully complicated, but I have an idea for a program that could incorporate such movement. How is it done?

Dick Knight
Asheville, NC

If Radio Shack sent manuals with its CoCos that told us everything there is to know about our machines, the manuals would have to be sold in volumes, and I'd be out of a job like this one. I can help you start moving things around on the screen without having to dimension arrays or learn animation commands like `GET` and `PUT`.

To begin, think of any spot on the graphics screen as having a horizontal and a vertical coordinate. (To shorten this, we'll call them `H` and `V`.) A standard example of the use of these coordinates might look like this:

```
DRAW"BM75,90;R10NH3G3"
```

This will draw a small arrow at coordinates 75 across from the left and 90 down from the top of the screen. Suppose you'd like to move that arrow around on the screen. You'll have to erase that arrow and redraw it in another location. Not too hard if you only have to move it once. On the other hand, if you have to move it several times, this procedure could take up quite a few lines and quite a bit of memory. Let me show you a shortcut that will prove invaluable to you later.

First, let's put that graphic arrow in a string statement, `A$="R10NH 3G3"`. Next we'll assign variables to the two coordinates, `H = 75` and `V = 90`. So far, your program should look like this:

```
10 PMODE 4,1:SCREEN 1,1:PCLS1:
COLOR 0,1
20 A$="R10NH3G3"
30 H=75:V=90
```

Line 40 should read `DRAW"BM=H;,=V;C0"+A$`. By doing this, you've told the computer to go to coordinates `H` and `V` and then to `DRAW A$`, an arrow in this case. Now when you want to move that arrow around on the screen, change the values of `H` and `V`, and the arrow will reappear at the new coordinates. In some cases, you may want to erase the original arrow before drawing a new one. You can do that by adding these lines:

```
40 DRAW"BM=H;,=V;C0"+A$
50 FOR X=1 TO 400:NEXT X
60 DRAW"BM=H;,=V;C1"+A$
70 H=H+2:V=V+2
80 GOTO 40
```

Line 40 draws the arrow at the first location in black, Color 0 (`C0`). Line 50 is a delay to let you see the arrow before it is erased in Line 60. (Line 60 redraws that same arrow, using the background color (`C1`) to make it appear invisible.)

Each time the program reaches Line 80, it returns and redraws that arrow two spaces to the right and two spaces down. (This was accomplished in Line 70.) Eventually, Line 40 will draw the arrow at coordinates that are *off the screen*, and you'll get an FC (Function Call) Error.

The following simple program will allow you to move your arrow (`A$`) around the screen by using the following keys: U for up, D for down, L for left and R for right. This arrow might be a pointer on a graphics screen menu or a cursor.

Bill Bernico, RAINBOW's newest columnist, is the author of more than 300 Color Computer programs. He founded Bill Bernico Software in 1987 and enjoys writing and recording his own music.

Line 50 sets you up so that you need to press one of these four keys to get a response. Line 70 moves `A$` up ten spaces when you press U. Line 80 moves it down ten spaces. Line 90 moves it to the left ten spaces, and Line 100 moves `A$` to the right ten spaces. Line 110 makes sure you can't go past the right edge of the screen, and Line 120 keeps you within the boundaries of the left edge. Lines 130 and 140 keep you within the bottom and top edges of the screen.

Once you press a key, you're brought back to Line 40, where the computer waits again for a key to be pressed.

```
10 PMODE 4,1:SCREEN 1,1:PCLS1:
COLOR 0,1
20 A$="R10NH3G3"
30 H=10:V=10
40 DRAW"BM=H;,=V;C0"+A$
50 I$=INKEY$:IF I$=''''THEN 50
60 DRAW"BM=H;,=V;C1"+A$
70 IF I$="U"THEN V=V-10
80 IF I$="D"THEN V=V+10
90 IF I$="L"THEN H=H-10
100 IF I$="R"THEN H=H+10
110 IF H>245 THEN H=245
120 IF H<10 THEN H=10
130 IF V>185 THEN V=185
140 IF V<5 THEN V=5
150 GOTO 40
```

A Long Adventure

Dear Bill:

I'm working on a four-part series Adventure game. Is there a poke, line, or routine that will give me more memory to work on these Adventures?

Domingo Martinez
Miami, FL

This is not a difficult problem to solve. However, to answer your question specifically, I need to know what kind of Adventure you are writing (text or graphic) and how your Adventure is saved (to tape or disk). I will assume that you are using a tape system to create a text Adventure. Depending on the amount of additional memory you need, there are two solutions.

The first solution is the easiest, but it doesn't give you the maximum memory. Typing `PCLEAR 1` directly into the computer will give you extra memory with which to work. If type `PRINT MEM` and press ENTER at power up, you'll see the number 24871 as your memory allotment. If you type `PCLEAR 1` and then enter `PRINT MEM`, you will gain an additional 4,608 bytes of memory. This solution will work for either tape or disk.

The second solution will only work for tape systems. At power up, type `POKE 25,6:NEW` and press ENTER. Now when you enter `PRINT MEM`, you will see that you've gained 6,144 bytes of memory. Keep in mind that neither of these solutions will work if your program uses graphics pages. Neither `PCLEAR 1` nor `POKE 25,6:NEW` allow graphics.

If you are working from disk and are not using graphics, you may do the following: Before you begin entering line numbers, type `POKE 25,14:POKE 26,1:POKE 3584,0:NEW` and press ENTER. This poke will wipe out anything that you have entered, so use this immediately following start up.

Questions about specific BASIC programming problems can be addressed to BASICally Speaking, THE RAINBOW, P.O. Box 385, Prospect KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. We are unable to answer letters individually.

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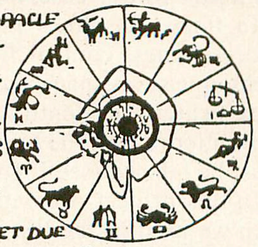

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Use last month's project to power your imagination

Project Expansion

By Tony DiStefano
Rainbow Contributing Editor

Last month, we started a one-chip beginner's project that turned on some LEDs. Let's expand that idea to a four-chip project that controls more than a few LEDs. We will begin with a short explanation of the electronic theories used in this project. Once you understand what we are doing, all you will need is a little patience and a few parts to complete this project.

If you look at the diagram we will use for this project (Figure 1), you will see that it differs in several ways from the one we used for the first part of the project. First, because there will be no changes in the circuit that involve the LEDs, I removed all the LEDs and their resistors from the diagram. This gives me more room to work and makes the schematic less cluttered. Leave the LEDs on your board, just expand it. Next, in the original diagram I used separate wires to connect the pins on the connector to the corresponding pins on the computer (i.e., D0 on the computer to D0 on the chip). During that phase of the project, each wire went to only one place.

When I expand, however, I must use a technique known as bussing to connect one pin to more than one other pin. To illustrate this change in the diagram, I used a thick line called a Bus line. This line indicates that several wires are grouped together. In such a grouping, the wires generally have something in common. In this case, all the wires are data lines. Bus lines may also carry address lines, control lines, etc. This technique saves space and makes things look neater. To identify these wires as they enter or exit the bus line, the wires must be labeled (see Figure 1).

In this project, we will use the same chip we used in the last phase, and we will change only one wire on this chip. If you begin with last month's project, the only wire you will need to change is the one connected to Pin 11.

Now look at U2 — a TTL chip 74LS138. It is a 3-to-8 decoder. In binary, one bit has two different conditions, two bits have four and three bits have eight. U2 takes a three-bit binary input and decodes it into eight different combinations. The three inputs are A, Y7. Normally, all but one of the outputs are high. The low output depends on the condition of the three inputs and the three control lines. The output is disabled (all high) unless G2A and G2B are low and G1 is high.

Look at the six inputs and their connections on the schematic. We can see from the three control lines that the outputs will work only when the following conditions are met:

1 — The SCS pin (G2B) is low. When this occurs, we can access the I/O area of the CoCo, located from $FF40 to $FF5F.
2 — The A4 pin (G1B) is low. This limits access. When A4 is low, we can access $FF40 only to $FF4F — half of the previous area. If we decode more address lines, we can limit it to a smaller area, but that is not required now.
3 — The E pin (G1) is high. This ensures that the data is valid when we use more than one chip. The CPU specifications manual states that data and address is valid during the high portion of the E clock.

Let's look at what we have so far. The chip select is properly active between $FF40 and $FF4F. Inputs A and B are connected to A0 and A1 respectively. This decodes to one of four memory locations (represented by Y0 to Y3 if our third input (R/W) is low, and Y4 to Y7 if R/W is high). If you look at the function of the R/W line, you will understand the final stage of this IC. In the CoCo, when the R/W line is high, the CPU reads in data from whatever address area the address bus dictates (represented by the PEEK command in BASIC). When the R/W line is low, the CPU writes data to whatever address area the address bus points (represented by the POKE command in BASIC).

Instead of the one memory location to which you could write in last month's project, you now have four memory locations to which you can write (Y0 to Y3) *and* four from which you can read (Y4 to Y7). (More about the read locations next time.) Looking at Figure 1, you see that Y0 is connected to U1's CLK. Writing (or poking) data to $FF40 will transfer that data to U1 and, in turn, light up the LEDs. That much of our project remains the same. Now, however, we have another data latch — U3. Because U3 is the same chip (74LS273) as U1, it presents the same output characteristics as U1. However, we want to control more *fun* things than LEDs with this chip.

Unfortunately, the 74LS273 chip cannot supply much current, so we will need another *buffer* chip that can. We will use the 7406 chip, which is a hex open-collector inverter/buffer chip. As an open collector, the chip can only act like a SPST (Single-Pole, Single-Throw) switch with one side connected to ground. It cannot supply voltage. As an inverter, the chip inverts the incoming signal, and as a buffer it can supply a larger sum of current. When the input to one of these inverters is high, the switch (output) is considered closed. When the input is low, the switch is opened. With this information, we can use our circuit to control small DC devices.

Look at Q1 of U3. It is connected to an input of one of the hex buffers (Pin 1 of U4). The output (Pin 2) goes to the negative side of a small DC motor. The other side of the motor connects to VEE. Connecting VEE to the CoCo's VCC puts 5 volts on the motor.

Before you connect *any* motor to our circuit, however, there are a few rules to follow. These important rules *must not be broken*. If they are, *permanent* damage may occur to your circuit and to your computer.

The chips on this board have a 5-volt control voltage. This voltage comes from the CoCo through Pin 5 on the connector. According to Tandy, the

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Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

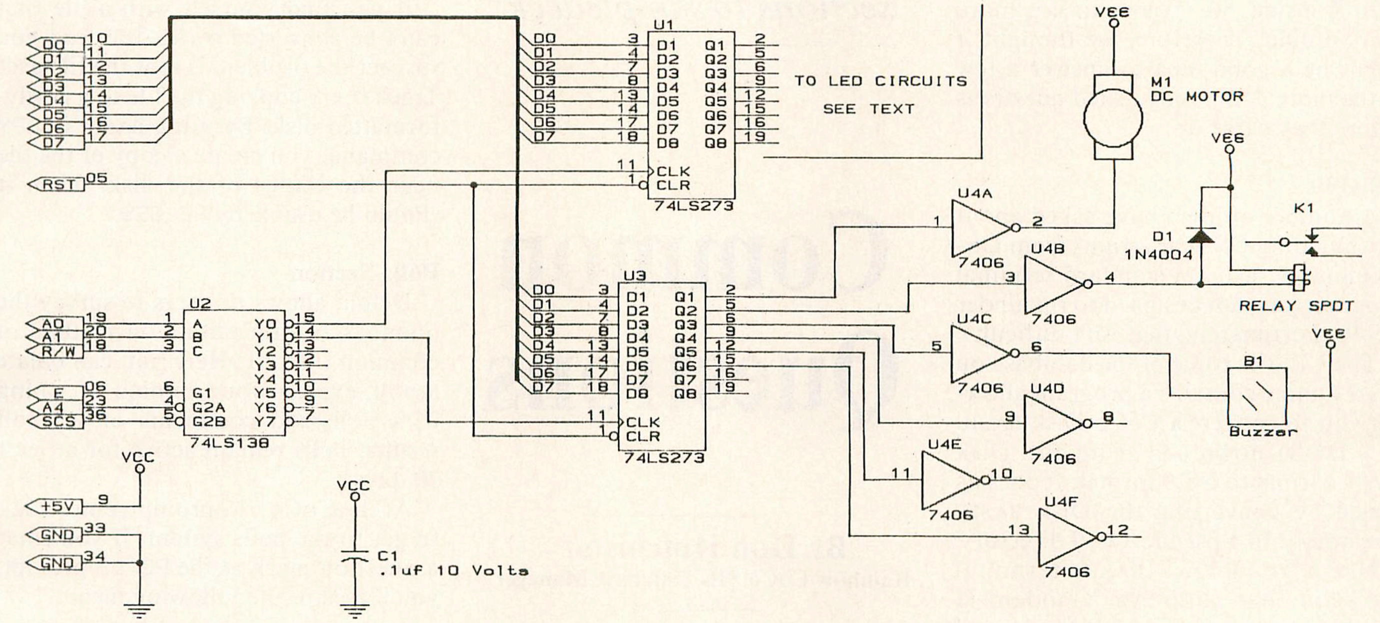

Figure 1

current limitation on this supply is 300 ma (milliamps). It takes 1000 milliamps to make 1 amp, so 300 ma is .3 amp. Drawing more than 300 ma from the computer may damage the power supply. So how does one know when the limit is reached? When the computer smokes — just a joke, but drawing more than 300 ma isn't. If you have a meter that can measure current, you're in luck; if you don't, you'll have to calculate how much current you are using. TTL chips generally draw about 10 ma each. Depending on what you have on at the same time, you are left with about 250 ma. When the LEDs are on, they draw approximately 50 ma more. That leaves you with about 200 ma for the rest of the circuit.

The amount of current drawn by small devices (e.g., motors, relays and buzzers) is usually marked on the device. To be completely safe, you should not go over 300 ma for all connected circuits. Unfortunately, that may not leave you with many connected circuits. In that case, make sure you turn on the circuits one at a time.

Another solution is to power the devices with an external power supply. Radio Shack sells several DC adapters — some with multi-voltages. If you power your devices externally, make sure the device and adapter you use are the same voltage. Connect the negative side of the adapter (usually black wire) to the ground of the project circuit and connect the positive side (usually red wire) to the point marked VEE on the device — not to the VCC of the computer. The maximum voltage you can use externally is 15 volts. More than that risks damage to the buffers. In addition, each buffer can sink only about 50 ma.

I got the small devices that I used from the Radio Shack catalog. I used the relay (Cat. No. 275-243), but look through the catalog; there are many things you can hook up. Use your imagination to control a robot arm, electric race car, train set, etc. But remember, it's important to match the voltages and not exceed current limitations. Most Radio Shack items mention voltages and currents.

Anything you use will connect in the same way — the negative (black wire) connects to the outputs of the buffers, and the positive (red wire) connects to the VEE source (either the VCC of the computer or the plus of an external DC adapter). The schematic shows only six buffers, because there are only six buffers in one chip. If you need the other two outputs of U3, you will need another 7406 chip.

To construct this project, continue as you were instructed in the last column. If you plan to use many small devices, leave room for other control circuits by using a multi-pin connector and mounting the devices on a separate board. When you build this, remember that Figure 1 does not show the +5 volt and ground connections shown for U1 to U4. Those connections are listed below:

IC	+5 volts	GND
U1	20	10
U2	16	8
U3	20	10
U4	14	7

Well, that's it for this time. Enjoy your new toys. Next time we'll look at some input devices the computer can read.

Problems to solve, SIG sections to sampledeck

Common Questions

By Don Hutchison

Rainbow CoCo SIG Database Manager

Now that the weather is a bit colder and people are moving inside, we expect to see more users online. Therefore, we thought it might be a good idea to answer a few of the more commonly-asked questions before they came up.

RS-OS9

A number of users have asked about downloading OS-9 programs from OS-9 Online by using a standard terminal program (one not designed to run under OS-9). Fortunately, that isn't difficult.

The Utilities topic of the database on OS-9 Online contains a program allowing you to convert a CoCo Disk BASIC (RS-DOS) download from the Disk BASIC format to OS-9 format. It does its magic by converting the Disk BASIC directory into a pseudo-OS-9 directory.

Use a good Disk BASIC terminal program that supports Xmodem (I usually recommend *MikeyTerm*) and download `RS-OS9.BAS` from the Utilities database. Now, download the desired OS-9 program onto a freshly-formatted Disk BASIC disk. After that, just enter `RUN "RS-OS9"` to convert the disk format.

Please note: The program does *not* create a rigorous OS-9 format, so it's best to *copy* this file onto a true OS-9 disk as soon as possible. Then you can boot OS-9 and set the required permissions via OS-9's `Attr` command, as shown in the following example:

```
attr /d0/cmds/xcom9 e w r
```

(This example assumes that you copied a binary program called *XCom9* into the `CMDS` directory.)

There are a couple of important restrictions to this procedure. First, Track 0 must be unused in order for `RS-OS9` to do its work. The utility checks to see if Track 0 is in use and will abort the conversion if it is. Second, only the first 12 files will appear in the OS-9 disk's directory. This should be sufficient for most purposes. However, remember that subsequent disk writes by either operating system will make the other directory obsolete.

In addition, I recommend that most users use *MikeyTerm* because of the way it handles the file creation chores. *MikeyTerm* writes files to disk in exactly the same way Disk BASIC does (i.e., keeping the files clustered near the *middle* track of the disk, which is also near the directory).

Other terminal programs (notably *RickeyTerm* and *GETerm*) will start writing files on Track 0, which is not usually a problem. However, because OS-9 uses Track 0 for its directory, `RS-OS9` will not allow Track 0 to be in use. You can save yourself some hassle by using *MikeyTerm*.

If you find yourself with a file that can't be converted by `RS-OS9` and you suspect the problem is that the file uses Track 0, try copying the file to a newly-formatted disk. By using BASIC's `COPY` command, you create a copy of the file near the center of the disk. Then it should be usable by `RS-OS9`.

Polls Section

Delphi allows its users to survey the opinions of other users on matters of common interest. Here you can create a poll, express your opinion by voting in a poll, add comments or see poll results. Polls remain active for at least 30 days.

At the CoCo `SIG` prompt, enter `POLL` to get to the polls system. If you enter a question mark at the `POLLS` prompt, you'll receive the following menu:

Poll Menu:
Browse through poll results
Create a new poll
Edit your poll comment
Vote on a poll
Help
List poll names
Results with comments
Exit

Browse allows you to view each poll sequentially. Polls displayed won't show comments on the votes, but will carry a prompt after each poll asking if you

---

Don Hutchison is an electrical engineer living in Atlanta, Ga. He works as a senior project engineer and is involved in the design of industrial control systems. On Delphi, Don is the Database Manager of the RAINBOW SIG. His Delphi username is DONHUTCHISON.

Database Report

This month in the database produced a very wide assortment of uploads — probably something for everyone. Let's take a look at the new material.

OS-9 Online

The Applications topic of the database gives us **Paul Jerkatis** (MITHELEN), who uploaded a packed version of his BASIC09 game program, *Star Trek*.

In the Utilities topic, **Merle Kemmerly** (TOOK3) sent an error translator utility that translates error numbers into readable text. **Jeff Blower** (SEBJMB) posted an interactive window creation utility written in BASIC09 for the CoCo 3 under OS-9 Level II. This command gives the user the options of window type, device descriptor, foreground color and background color. **John Beveridge** (JOHNTORONTO) uploaded a disk zapper utility for Level II written in C by **Regan Johnson**. Finally, **Warren Moore** (WJMOORE) posted `CHWT`, which allows a user to change window types.

Chris Burke (COCOXT) posted a set of bug fixes for *RSB* Version 1 in the Patches topic of the database.

In the Telcom topic, **Jim Hollier** (PGJIM) posted several support files to facilitate Xmodem and Ymodem file transfers for remote users. Jim also provided a simple directory utility that displays the current directory in file size, and in Xmodem or Ymodem blocks.

In the Graphics & Music topic, **Chris Duncan** (CWDUNCAN) uploaded a catalog of the Graphics & Music topic of the database in alphabetical order and by subject. Finally, **Dennis Weldy** (OS9ER) uploaded the C source code for his `QuadDump` utility.

CoCo SIG

Merle Metzger (MERLEMETZGER) posted a text file in the General topic that describes a *plagiarization* of the share-want to vote, read comments or skip to the next poll. Using this feature, you can vote on every poll sequentially. You can also enter the first few letters of the name of the poll you wish to peruse. To find the name of the poll you want, enter a question mark. The polls will be listed.

Create lets you create a poll to sample the opinions of other Delphi users. Enter the poll's name, which has a 60-character maximum, and select a poll format. Then enter the text to present your issue to the voters.

Edit permits you to amend or add to your comments after you vote on a poll, and *List* presents names of all available polls. *Results* shows you the complete results of any poll, including comments. While in the Poll Menu, you can directly view poll results without the prompt "Which poll?" by typing `RESULTS` followed by the name of the poll. *Vote* allows you to vote on a certain poll. You will be prompted for the particular poll name.

The following is a sample session in the polls system. First, let's get a listing of all the active polls by typing `lis` at the poll prompt. The following is a list of polls on the CoCo SIG that were active when I wrote this column:

Do you program on the CoCo?
Which word processor do you use, and why?
How many CoCo people own another home computer?
Why OS-9?

OK, now let's choose a poll of interest to examine further. Let's look at the poll entitled "Why OS-9?" To do so, type the following at the poll prompt:

```
results why os9?
```

At this request, the screen presented the following information:

Why OS-9?, created by MIKEWARD. Creation date: SEP 7,1988. Do you think that Tandy limited itself by restricting new software submissions to run only in an OS-9 environment? Has this had a negative impact on the CoCo software market from Tandy?

Choice	Votes	Percent
Strongly Agree	8	21%
Agree	7	18%
Uncertain	4	10%
Disagree	7	18%
Strongly Disagree	11	29%

Total Vote:	37	

Comments:
"I find (thus far) that I have no need for OS-9, so I naturally look for software that will run under Disk BASIC."
"As a programmer, I know there are a number of things (games) that can't be done nearly as well under OS-9."
"Tandy may have limited the number of infrequent users, but people who use the CoCo for more than games will find the versatility and power of OS-9 to be far superior. I admit that there is a huge learning curve for the beginner."

After displaying all the poll results, Delphi will ask if the user wants to vote. Naturally, you will answer Y (yes) to vote or N (no) to stop.

Next time you're online, check out the Polls section of the SIGs. A lot of people want to see your comments.

A Few Notes

In cooperation with PCM, The Portable Place has available the programs for portables from PCM ON DISK. We post these files each month in the PCM topic of the database, where they will be available for instant access via downloading. (These programs carry a $3 surcharge.) At the time of this writing, all of the portable PCM files for the 1986, 1987 and current 1988 calendar years are online.

James Farmer (MODEMMASTER) has been very busy this month converting digitized pictures into `GIF` format for the Person-to-Person SIG. James posts the pictures in Person-to-Person for others to download and view. SIG members hope to introduce people to each other in this way.

If you'd like James to digitize your picture, send a good photograph of yourself (the bigger the better), and he'll take it from there. Send your photo to James Farmer, 5311 Barwick Road, N. Charleston, SC 29418. If you want your photo returned, please include an SASE suitable for photos. Remember to add some stiffening material so that your photo won't get crushed or bent in the mail.

That's it for this month. Feel free to send your suggestions for future Delphi Bureau columns to me (DONHUTCHISON) via Delphi Mail. □

ware terminal program *Ultimaterm*.

In the CoCo 3 Graphics topic of the database, **Bob Wharton** (BOBWHARTON) uploaded four more of his popular pictures of rock group logos. Bob also sent us his converted drawing of the popular *Penguin Lust* graphic. **David Mills** (DAVIDMILLS) gave us a great new micro viewer utility for enlarging your favorite CoCo 3 graphics. David also posted an excellent close-up picture of Vanna White, and a text file from **Brad Bansner** that describes some of the techniques artists can use to increase their chances of winning a CoCo Gallery prize. **Marty Goodman** (MARTYGOODMAN) sent us a character font for *TW-80* that is very similar to the font used by *V-Term*. **Christopher Smith** (POSSUMDARK) uploaded fifteen MacIntosh nude pictures, and **Daniel Poirier** (DIGITIZER) uploaded a page-turner utility for viewing multiple graphics images from memory. **Jim Tatarka** (TATARCOCO) uploaded two *CoCo Max 3* pictures, one of the rock group Grateful Dead and the other of a scene from *Robocop*. While **Richard Trasborg** (TRAS) gave us a GIF converter for viewing GIF pictures on a CoCo 3, **Greg Miller** (GREGMILLER) uploaded the technical specifications for the MGE picture file format. Finally, **Colin McKay** (COLINMCKAY) posted seven MGE pictures drawn by H.U.D.

In the Utilities & Applications topic, **Robert Pierce** (RPIERCE) sent a great disk directory sort subroutine for the CoCo 3, and **James Wilcox** (2USER) posted a record-keeping program. **John Lucas** (DUSTIN) gave us a fix for using *TW-80* with double-sided drives. **Ken Halter** (KENHALTER) posted some useful utilities for CGP-115 users and a utility for use with the Disto controller, which finds the most current version of a utility. **Ezra Story** (EZY) sent a disk file organizer for the CoCo 3, and **Mike Sweet** (DODGECOLT) uploaded *CirCAD*, a drawing program to aid in designing single-sided PC boards. **Alan DeKok** (ALANDEKOK) uploaded his patch files, which allow the use of a Hi-Res adapter with the popular game *Shanghai*.

Christopher Smith posted a solution file to the game *Hitch Hiker's Guide* in the Games topic of the database. Colin McKay uploaded a *Sea Battle* game, and Ken Halter sent us his favorite *Racko* game.

In the Classic Graphics topic, **Kurt Stecco** (HIGHRAILER) uploaded a BASIC program that draws a patriotic graphic, and **Jay McGraw** (MACJUNIOR) posted a BASIC program that draws a picture of a Thunderbird automobile.

In the Music & Sound topic, **Mike Stute** (GRIDBUG) uploaded a music file for *Lyra* called `Alchemy`.

Finally, in the Data Communications topic, Daniel Poirier uploaded two WEFAX pictures taken from a GOES satellite.

See you online on Delphi!

Make composition writing simple

Hold That Thought!

By Fred B. Scerbo
Rainbow Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

Sometimes the hardest thing to do is to sit down and write an article. Just arriving at the right combination of words for an introduction or opening paragraph can often take longer than writing the entire article.

However, many years ago, when I first became a teacher, I was taught a simple technique to make composition writing easier. That technique is called *brainstorming*, and it lets you gather all the information you need in a free-flowing manner.

My first contact with brainstorming came at an educators' workshop where the guest speaker was Sidney Simon, who is the author of a number of books on values clarification. I have been a fan of his writing for many years.

The Technique

Brainstorming is very simple to do. In fact, you may already be doing it and not realize that it is a valid composition technique. In brainstorming, you simply take a blank sheet of paper and jot down virtually everything and anything that might be of value to you in the article or composition you are writing. You don't have to be neat about it or write on lines. You just cover the paper with every idea that comes into your head that might relate to your writing.

After you have done that, circle the most important things you have written on the sheet. You may also wish to rank the ideas from one (important) to five (not so important). From that point, you have a working skeleton on which to base your writing.

Sound simple? It certainly is, but you would be amazed at the number of people who do not even possess this simple skill when it comes to writing.

Some people will agonize over a blank piece of paper and never be able to get the thing started.

Believe me, brainstorming works. Often in recent years, however, I have been reluctant to use this method since I do the majority of my writing on a word processor on my CoCo or Model 100. Years of hacking on my CoCo have given me the ability to type much faster than I can write. Therefore, brainstorming was put on the back burner.

Since I have been writing a number of political commentaries for our local newspaper recently, the need for this technique has come back — I had quite a bit to say, but wasn't ready to organize these ideas on a word processor.

That's when the idea of a brainstorming program hit me. Why not use a CoCo program to sort important data? That's how the idea for my program, *Brainstorm*, came about.

The Program

Brainstorm is written to run on even a 16K machine. You do not need a disk drive to make it work, but a line printer is almost essential. (If you are considering using your CoCo for composition writing, you probably already have a printer. Otherwise, why would you be using a CoCo for composition skills?)

The program has instructions embedded in the introduction, but it will not hurt to go over them here.

Using the Program

Brainstorm lets you create up to fifty short statements you may want to use in a composition you are writing. The screen numbers them from 1 to 50 and gives you a blank screen for each idea.

The program has been designed to prevent word-wrap at the end of the screen. In that regard, it works just like a word processor. However, you do not have a print-over cursor. You must make corrections by using the left arrow, which erases as it backs up.

The program is not designed for you to write really long statements. An eighty-character line is usually just about right. You will probably find that each idea statement might contain only five or six words anyway.

A composition on the SDI (Star Wars) defense program might have you developing short statements like:

- The program may cost over one trillion dollars.
- We have no way to shoot down enemy ICBMs now.
- Ground-based lasers are used.
- Weapons may be put in orbit.
- Advanced computers play a big role.

As you can see, I just jotted down a few ideas that came off the top of my head. They are in no specific order; they are listed just as they came to mind.

Brainstorm lets you jot down these ideas on the screen. When you complete each idea, just press ENTER.

You then have three choices. Pressing C lets you correct what you have just written. Pressing N lets you go on to the next idea, and pressing E lets you end the entering of ideas. If you press E, you will be asked if you are certain. Answer either yes (Y) or no (N).

Once you have entered all the ideas, you can rank them. The screen will display each statement and ask you to rate it in importance on a scale of one to five. That way, the program can sort the information from most important to least important.

At that point, you can either view the information on the screen, print it out on paper, or save it to disk. By saving to disk, you can use the data with a word processor. You may want to use SHIFT-0 to get upper- and lower-case letters when you type the ideas. That way, you can use them in the body of your article by shuffling them around.

That's all there is to it. If you have a mental block when it comes to writing, *Brainstorm* should help you get over the obstacle. ☐

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

Dr. Preble's Programs

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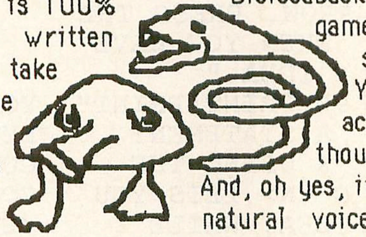
Pyramix

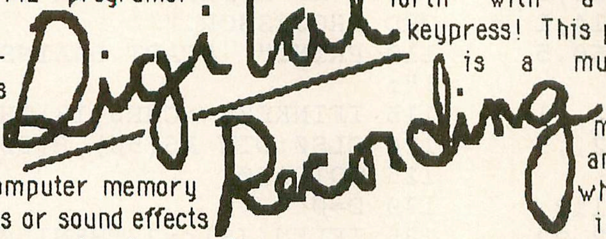
This fascinating CoCo 3 game continues to be one of our best sellers. **Pyramix** is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordon Tsvetkoff and a product of **ColorVenture.**



The Freedom Series

Vocal Freedom

I've got to admit, this is one nifty computer program. **Vocal Freedom** turns your computer into a digital voice recorder. The optional **Hacker's Pac** lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the pre-recorded message! Disk operations are supported. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone.



Mental Freedom

Would your friends be impressed if your computer could read their minds? **Mental Freedom** uses the techniques of Biofeedback to control video game action on the screen. Telekinesis? Yes, you control the action with your thoughts and emotions. And, oh yes, it talks in a perfectly natural voice without using a speech synthesizer! Requires Radio Shack's low cost Biofeedback monitor, Cat. #63-675.

BASIC Freedom

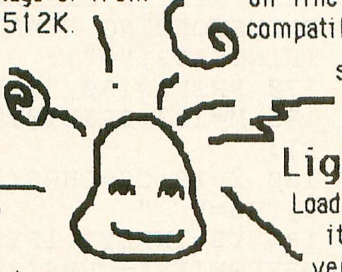
Do you ever type in BASIC programs, manually? If you do, you know it can be a real chore. **Basic Freedom** changes all that. It gives you a full screen editor just like a word processor, but for BASIC programs. Once loaded in, it is always on-line. It hides invisibly until you call it forth with a single keypress! This program is a must for programers or anyone who types in programs. By Chris Babcock and a product of **ColorVenture.**

Lightning Series

These three utilities give real power to your CoCo 3.

Ramdisk Lightning

This is the best Ramdisk available. It lets you have up to 4 mechanical disk drives and 2 Ram drives on-line and is fully compatible with our printer spooler below



Printer Lightning

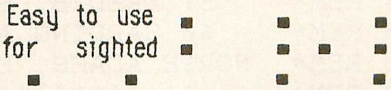
Load it and forget it--except for the versatility it gives you. Never wait for your printer again! Printer runs at high speed while you continue to work at the keyboard!

Backup Lightning

This utility requires 512K. Reads your master disk once and then makes superfast multiple disk backups on all your dirves! No need to format blank disks first! Supports 35, 40 or 80 track drives.

COCO Braille

Produce standard grade 2 Braille on a **Brother** daisy wheel printer. Easy to use for sighted or blind user. No knowledge of Braille is necessary. Call for free sample.



Prices

CoCo 3 only

Ram Disk Lightning, Disk	$19.95
Printer Lightning Disk	$19.95
Backup Lightning, Disk	$19.95
All three, Disk	$49.95
Pyramix, Disk	$24.95

CoCo 1,2, or 3

Vocal Freedom, Disk	$34.95
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COCO Braille	$69.95

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Mental Freedom, Disk	$24.95
Basic Freedom, Disk	$24.95

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VDOS, The Undisk, ramdisk for the CoCo 1 or 2 only, Tape	$24.95
VDUMP, backup Undisk files to single tape file, Tape	$14.95
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Add $2.50 shipping/handling in USA or CANADA
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50	179
85	133
140	29
200	46
280	165
350	123
END	203

The listing: BRAINSTM

```
1 REM****************************
2 REM* BRAINSTORM SCRATCH PAD   *
3 REM*     QUICK WRITING AID    *
4 REM*     BY FRED B. SCERBO    *
5 REM*     60 HARDING AVENUE    *
6 REM*  NORTH ADAMS, MA 01247   *
7 REM****************************
8 CLEAR3000
9 CLS0
10 PRINTSTRING$(32,220)STRING$(3
2,204)STRING$(32,188);
15 FORI=1TO160:READ A:PRINTCHR$(
A+128);:NEXT
20 PRINTSTRING$(32,188)STRING$(3
2,204)STRING$(32,220);
25 PRINT@390," QUICK WRITING AID
 ";
30 PRINT@422," BY FRED B. SCERBO
 ";:PRINT@454," COPYRIGHT (C)198
8 ";
35 DATA125,124,121,116,126,124,1
14,126,124,122,125,120,125,114,1
17,120,94,92,90,46,46,42,62,60,5
8,29,28,25,85,92,94,93
40 DATA117,,117,,122,,122,122,,1
22,117,,117,116,119,,90,,,,42,,5
8,,58,21,,21,85,,90,85
45 DATA117,124,121,,126,125,112,
126,124,122,117,,117,,117,,92,92
,90,,42,,58,,58,21,28,26,85,,90,
85
50 DATA117,112,117,,122,,122,122
,,122,117,,117,,117,,82,,90,,42,
,58,,58,21,16,21,85,,,85
55 DATA124,124,120,116,124,,120,
120,,120,124,120,124,120,124,120
,92,92,88,36,44,,60,60,56,28,24,
20,84,,,84
60 IFINKEY$<>CHR$(13)THEN60
65 CLS:PRINT@32,"   'BRAINSTORMIN
G' IS A SIMPLE    TECHNIQUE USE
D TO HELP YOU     PREPARE A COM
POSITION OR A     SMALL REPORT.
"
70 PRINT:PRINT"  USE THIS PROGRA
M TO JOT DOWN     SHORT SENTENCES
 OR IDEAS THAT    YOU KNOW WOULD
BE IMPORTANT      TO THE TOPIC YO
U ARE GOING       TO WRITE ABOUT.
"
75 PRINT:PRINT"   TYPE THE IDEAS
DOWN IN ANY       ORDER AS YOU WO
ULD ON SCRAP      PAPER."
80 IFINKEY$<>CHR$(13)THEN80
85 CLS:PRINT:PRINT"  THE SCREEN
WORKS MUCH LIKE A    WORD PROCES
SOR. YOU CAN MAKE    CORRECTIONS
 USING THE           BACKSPACE A
RROW. PRESS THE      <ENTER> KEY
 WHEN YOU HAVE       COMPLETED A
N IDEA."
90 PRINT:PRINT"  YOU MAY CORRECT
 A STATEMENT      BY PRESSING <C>
 & USING THE      CURSOR. PRESSIN
G <N> LETS YOU    GO TO THE NEXT
IDEA, WHILE       <E> WILL END YO
UR INPUT FROM     THE KEYBOARD."
95 IFINKEY$<>CHR$(13)THEN95
100 CLS:PRINT:PRINT"  YOU WILL N
EXT BE ASKED TO GO    OVER ALL Y
OUR NOTES AND RATE    THEM IN IM
PORTANCE FROM ONE     TO FIVE. W
HEN YOU HAVE DONE     THIS, THE
PROGRAM WILL SORT     YOUR IDEAS
 IN ORDER OF THEIR    IMPORTANCE
."
105 PRINT:PRINT"  YOU WILL THEN
HAVE THE OPTION   OF VIEWING YOU
R IDEAS, MAKING   A LIST WITH A
LINEPRINTER, OR   SAVING THEM TO
 DISK AS A FILE   FOR USE ON A W
ORD PROCESSOR."
110 PRINT"  START BRAINSTORMING!
!";
115 IFINKEY$<>CHR$(13)THEN115
120 CLS0:DIM A$(50),B(50)
125 GOTO160
130 D=0
135 IFLEN(J$)<=27THEN150
140 FORT=27TO0STEP-1:IFMID$(J$,T
,1)=" "THEN155
145 NEXT
150 W$=J$+C$:F=LEN(W$):PRINT@M+D
,W$:RETURN
155 W$=LEFT$(J$,T):C$="":W$=W$+C
$:F=LEN(W$):PRINT@M+D,W$:C$=D$:J
$=S$+RIGHT$(J$,(LEN(J$))-T):D=D+
32:GOTO135
160 CLS:Q=Q+1:IFQ>50 THEN240
165 PRINT@0,STRING$(32,"=");"  B
RAINSTORMING SCRATCH SHEET    ";S
TRING$(32,"=");
170 PRINT@130,"IDEA NUMBER ";Q
175 M=193:PRINT@193,"=>"+CHR$(12
8);
180 X=29:C$=CHR$(128):D$=CHR$(12
8):S$="  "
185 Y$=INKEY$:IFY$=CHR$(13)THEN2
05ELSEIFY$=CHR$(8)THEN195ELSEIFY
```

```
$=""THEN185
190 R$=R$+Y$:J$="=>"+R$:PRINT@29
1,"";:GOSUB130:PRINT:GOTO185
195 IFLEN(R$)<1THEN185
200 M=193:L=LEN(R$):R$=LEFT$(R$,
L-1):PRINT@M,"";:J$="=>"+R$:GOSU
B130:PRINT:GOTO185
205 PRINT@384,STRING$(32,"=")"
(E)ND, (C)ORRECT, OR (N)EXT?  "S
TRING$(32,"=");
210 X$=INKEY$:IFX$="E"THEN230ELS
EIFX$="C"THEN215ELSEIFX$="N"THEN
220ELSE210
215 PRINT@384,STRING$(96,32);:GO
TO185
220 A$(Q)=R$:R$="":GOTO160
225 GOTO225
230 PRINT@416,"         ARE YOU SUR
E (Y/N) ?       ";
235 X$=INKEY$:IFX$="Y"THEN240ELS
EIFX$="N"THEN205ELSE235
240 IFR$=""THENQ=Q-1ELSE A$(Q)=R
$:R$=""
245 FORZ=1TOQ:CLS:D$="":C$="":PR
INT@32,STRING$(32,"=")" RATE THI
S IN IMPORTANCE ON A    SCALE OF
 (1)-HIGH TO (5)-LOW,  "STRING$(
32,"=");
250 PRINT:PRINT"   BRAINSTORM ST
ATEMENT #";Z
255 D=0:M=257:J$="   "+A$(Z):PRIN
T:GOSUB135
260 PRINT:PRINT"   LEVEL OF IMPO
RTANCE:=> ";
265 X$=INKEY$:IFX$=""THEN265
270 X=VAL(X$):IFX<1THEN265
275 IFX>5THEN265
280 PRINTX$;:B(Z)=VAL(X$)
285 FORY=1TO500:NEXTY:NEXTZ
290 CLS:PRINT@231,"NOW SORTING D
ATA";
295 IF Q=1 THEN325
300 S=0
305 FORZ=1TOQ-1
310 IF B(Z)<=B(Z+1)THEN320
315 T$=A$(Z):A$(Z)=A$(Z+1):A$(Z+
1)=T$:T=B(Z):B(Z)=B(Z+1):B(Z+1)=
T:S=1
320 NEXTZ:IFS=1THEN300
325 CLS:PRINT@102,"<<<<SELECT ON
E>>>>":PRINT@201,"A) VIEW LIST"
330 PRINT@265,"B) PRINT LIST":PR
INT@329,"C) SAVE TO DISK":PRINT@
393,"D) END PROGRAM"
335 X$=INKEY$:IFX$=""THEN335ELSE
IFX$="A"THEN340ELSEIFX$="B"THEN3
70ELSEIFX$="C"THEN385ELSEIFX$="D
"THEN425ELSE335
340 FORZ=1TOQ:CLS:PRINT@32,STRIN
G$(32,"=")" PRESS <ENTER> TO VIE
W NEXT ONE "STRING$(32,"=")
345 PRINT:PRINT"   BRAINSTORM ST
ATEMENT #";Z
350 M=257:J$="   "+A$(Z):PRINT:GO
SUB135
355 PRINT:PRINT"   LEVEL OF IMPO
RTANCE:=> ";B(Z)
360 IFINKEY$<>CHR$(13)THEN360
365 NEXTZ:GOTO325
370 CLS:PRINT@231,"NOW PRINTING
DATA"
375 PRINT#-2," BRAINSTORM DATA S
HEET":PRINT#-2," "
380 FORI=1TO Q:PRINT#-2,B(I);" "
;A$(I):NEXT:GOTO325
385 CLS:PRINT@227,"ENTER FILENAM
E:=>";
390 INPUT T$:IF LEN(T$)>8THEN385
395 T$=T$+"/TXT"
400 CLS:PRINT@231,"NOW SAVING DA
TA";
405 OPEN"O",#1,T$
410 FORI=1 TO Q:PRINT#1,A$(I):NE
XT
415 CLOSE
420 GOTO325
425 CLS:END
```

MLBASIC 2.0 - BASIC Compiler

If you want your BASIC programs to run up to 50 times faster, or want more programming features without learning another language, MLBASIC is for you.

MLBASIC is the most compatible BASIC compiler available for the Color Computer. WHY? Because MLBASIC fully supports:

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- Integer, floating point and string type variables and arrays
- Use of all available 512K RAM in the COCO 3
- 80,40 or 32 column text displays

MLBASIC not only contains everything that you would expect a BASIC programming language should contain, MLBASIC has features that offer flexibility of other languages like C, Pascal, FORTRAN and even assembly language. These features will allow programmers to directly access the CPU registers on the COCO, produce modular program code with SUBROUTINES, manipulate memory in blocks, and even call ROM routines in other areas of memory.

MLBASIC revision 2.0 has incorporated all enhancements that were suggested by MLBASIC 1.0 users and more. Revision 2.0 did away with all the incompatibility problems that existed with revision 1.0.

MLBASIC allows for the first time user to quickly compile a program using default compiler settings. The advanced user has the capability of controlling over a dozen settings which control where the program is compiled, which medium to compile to (memory or disk), string space, compiler listings and more.

With all this going for MLBASIC, your might expect the cost to be a little out of your budget. After looking at prices of other BASIC compilers for the COCO 3 you might be correct. But look again at this ad; for only $59.95, you can have a programming language that will spark your interest once again in the COCO.

Before you buy another BASIC compiler for the COCO, find out if it supports everything MLBASIC supports. Then look at the price tag. We feel that it won't be long before you place an order for MLBASIC.

"MLBASIC is a fine program for any serious programmer," said David Gerald in the December 1987 RAINBOW.

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COCO Q&A CONSULTATIONS

By Marty Goodman
Rainbow Contributing Editor

High-Speeds, Sector Editors, Terminal Programs, Hi-Res Graphics, Etc.

I have a number of questions. To begin, how can I keep a CoCo 2 or 3 in high-speed mode during most operations, but in low-speed for proper Disk I/O operation, without constantly typing in pokes? Where might I find an inexpensive disk-sector editor for Disk BASIC and OS-9, and the best commercial terminal program for the CoCo 3? How could I make and use BASIC programs that are bigger than the 24K allowed by Disk BASIC? Also, what is the highest resolution graphics mode available on the CoCo 3? Is there any way to get more than 64 colors on a CoCo 3?

James M. Huebner
Cumberland, WI

First, the CoCo 2 was not designed for use in the high-speed mode and should *never* be used that way. The CoCo 3 can run at double speed, but Disk BASIC's software was not designed for reliable disk operation at double speed. ADOS-3 from Spectrosystems corrects the flaws in Disk BASIC that cause the problems, and permits reliable access of the disk at double speed on the CoCo 3. After you burn it into a ROM and replace your vanilla Disk BASIC with the modified Disk BASIC, you will never have to poke different speeds on your CoCo 3 again.

Ken Wuelzer has a powerful disk editor, *KDisk*, and he sells both CoCo 2 and 3 versions for $15. Orders may be sent to Ken at 113 Arrowhead Dr., Montgomery, AL 36117. The two most sophisticated commercial CoCo 3 terminal programs I know are Cer Comp's *Data Pak 3* and Gimmesoft's *Vterm*. *Data Pak 3* offers Xmodem checksum protocol, downloading direct to disk and sophisticated auto-logon features. It also features some degree of VT 100 emulation. *Vterm* offers VT 100 emulation, but lacks sophisticated auto-logon capability. However, unlike *Data Pak 3*, it offers Ymodem capability (for 30 percent faster protocol transfer at 2400 baud if you use a packet-switching network) and has an optional software character font for its 80-column screen (considerably more pleasing to look at than the ugly GIME chip hardware font).

The highest resolution graphics mode on the CoCo 3 has 640 vertical and 225 horizontal lines. In practice, that mode is seldom used. The 640-resolution horizontal mode permits use of only four pure colors. The graphics mode most commonly used by professional CoCo-graphics programmers is the 320-by-192 mode. This mode permits use of 16 colors from a palette of 64 and is similar to color-graphics modes used on the IBM PC and the Atari ST series of computers. Get a CoCo 3 service manual (you can order one from any Radio Shack Store) or a copy of *Super BASIC Unraveled* (from Microcom) for detailed technical information about the CoCo 3, its GIME chip and video modes.

Next, Disk BASIC was written for a 32K CoCo 1, and was not substantially altered when it was brought over to the CoCo 3. It is incapable of using the extra memory in the CoCo 3. You must switch to OS-9 Level II and use BASIC09 to write larger programs.

Finally, by using the composite video output of the CoCo 3 and producing "artifact colors" on the screen, you can achieve a great variety of color shades. However, the results vary widely from TV set to set, and so professional programmers don't use that trick. It is also possible to achieve the illusion of many shades using mixed color patterns on an RGB monitor. But, speaking professionally, the CoCo 3 can reliably display and reproduce only just under 64 pure colors.

Powering a Hard Drive

Is the power supply in an FD 501 drive cabinet, or similar floppy drive cabinet, strong enough to power a standard hard drive? What sort of hard drive system equipment will I need? Can a power supply be "too strong" for a given drive?

Earl R. Blake
Owings Mills, MD
and Ken Halter
(KENHALTER)
Chino Hills, CA

In general, you *cannot* use a power supply intended for a floppy drive to power a hard drive. Almost all hard drive units require more power than a floppy drive needs. Burke & Burke, CRC, RGB Systems, and Owlware all have complete hard-drive packages available for those wishing to hook hard drives to their computers. Typically, these packages consist of a host-adapter card that plugs into the Multi-Pak Interface, a disk-controller board, the hard drive, including case, power supply, and cabling (in terms of their hardware), and software drivers for OS-9, Disk BASIC or both. These packages vary in cost, capabilities, and compatibilities. However, all should work fine under OS-9. It is more difficult to write software for a hard drive under Disk BASIC. Talk to the various producers of these systems before you choose. Owlware's system has been on the market longest. Burke & Burke's is low in cost because of its clever use of an IBM-style disk controller card. It also has extensive support for both Disk BASIC and OS-9. CRC's (Disto's) system can be set up without a Multi-Pak if you use its Super Controller,which saves space and cost. And RGB Systems concentrated on making a system with extensive Disk BASIC compatibility.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

When a power supply is rated in strength, that rating (usually expressed in amps at a given voltage, and sometimes expressed in watts) tells you the maximum power the supply is capable of delivering if asked by what is hooked up to it (i.e., capability). The power supply will put out only as much power as the device hooked up to it requests (unless the device wants more power than the power supply is capable of supplying, in which case the power supply will shut down, blow a fuse or start to burn up).

Correcting *Multi-Vue's* Docs

There's been a lot of confusion caused by a nasty typographic error in the Multi-Vue *documentation. The error occurs on Page 1-7. The documentation for Step 4 reads as follows:*

4. Type: `chx d0/cmds` ENTER

Change that to read:

4. Type: `chx /d0/cmds` ENTER

The slash before `d0` *is vital for getting this step to work. On Page 1-6, Step 4 is also in error. Currently it reads as follows:*

4. `edit /do/sys/env.file` ENTER

Change that to read:

4. `edit /d0/sys/env.file` ENTER

The incorrect version asks you to enter `do` *instead of* `d0`*.*

Greg Law
(GREGL)
SysOp for Delphi's OS9 Online SIG

Thanks for the warning, Greg. Readers can find other current corrections, fixes, patches and live advice on OS-9 matters on the Delphi OS-9 Online SIG.

Storing ML Addresses

I want to know how the starting, ending and execute addresses of a machine language program are stored. I looked in my Disk BASIC manual, but I didn't find this information. Can you help?

David Harris
Wyoming, MI

The valuable information you seek is not in your Disk BASIC manual. However, it is described in the book *Disk BASIC Unraveled*, sold by Microcom. That book is an annotated disassembly of the Disk BASIC ROM.

Binary Program files come in two types: *non-segmented* and *segmented.* Non-segmented files are created when you use the `SAVEM` command from BASIC. Segmented files are a bit more complicated. This file type allows you to load bits and pieces of code or data over *non-contiguous* parts of memory. You cannot create non-segmented files from BASIC in any straightforward manner, but it is easily created when you use an assembler.

On a disk, all binary program files start with a *five-byte preamble*. The first byte of this preamble is set to zero. The next two bytes specify the number of bytes of data in that segment, and the last two bytes specify the *starting load address* for the segment. If the file is non-segmented, the segment ends with a *postamble.* This starts with one byte set to $FF, then two bytes set to zero, and finally two bytes that specify the *execute address.*

If the file is a segmented binary program file, then after the first segment, you'd encounter *another* preamble that specifies another segment's length and starting load address. There can be any number of such segments before a final five-byte postamble is encountered. Therefore, you can have an ML program file that loads 5K bytes in one area of memory, then 3K bytes into another, etc.

Even a simple non-segmented binary file will be *10 bytes bigger* than the amount of data it contains because of the five-byte preamble and postamble. You can determine the execute address only after looking through the entire file to find its final, five-byte postamble.

Similar MS-DOS Programs

Are there any exact work-alike *versions of the IBM programs* Lotus 1-2-3 *or* WordStar? *If not, why doesn't someone write some?*

David Johnston
Torrington, CT

Computerware sells a program called *Screen Star* that is quite similar to *WordStar.* Frank Hogg Laboratory sells *DynaStar*, which is somewhat like *WordStar.* While neither of these are exact work-alikes, if you are familiar with *WordStar* you should be able to use these other programs without difficulty.

Both programs run under OS-9. While neither can directly read an MS-DOS disk, there are OS-9 utilities that do this. DP Johnson sells such a utility, and Granite Computer Systems has just introduced an elaborate file transfer utility between OS-9 and MS-DOS that even supports file location within subdirectories on an MS-DOS disk.

I do not believe that either *Screen Star* or *DynaStar* uses the exact same file format as *WordStar*, so you'll have to save text files in ASCII to bring them across.

I don't know of any work-alike of *Lotus 1-2-3* for the CoCo 3. The 512K CoCo 3 is a powerful machine, capable in theory of doing almost anything an IBM PC XT clone can. But few CoCo owners are willing to pay $300 to $600 for a piece of software, so developers are unlikely to take the time and effort needed to rewrite and market such complex packages as *Lotus 1-2-3*. Also, while hard disk drives are nearly standard on IBM PC clones, they are rare among CoCo owners. Complex, massive programs like *Lotus 1-2-3* really need a hard drive to be usable.

On the other hand, OS-9 Level II users can choose from several powerful database and spreadsheet programs, including *Sculptor* and *DynaCalc*, from Frank Hogg Laboratory. Such OS-9 Level II users can increase their disk system's performance without a hard disk drive by using one of the three No-Halt disk controllers available from Disto, Performance Peripherals, and Sardis.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.

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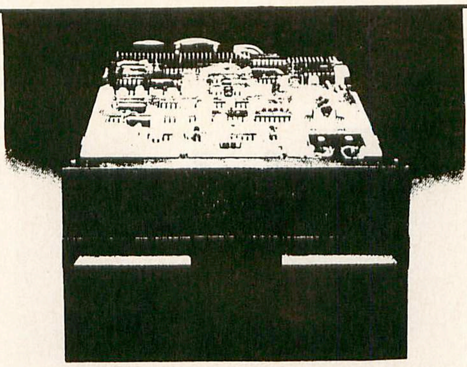

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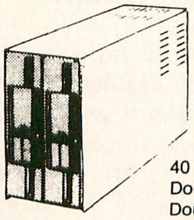

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DOCTOR Q&A ASCII

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

Easy Transfers

I am currently finishing a lengthy novel, which has been written using Telewriter 64 *on an upgraded 64K CoCo. Files are stored on a cassette, and hard copies are printed with a Smith-Corona TP-I. It's a wonderful combination, but it would facilitate my editing if more of my copy could be stored on one cassette or disk. With that in mind, I have been investigating moving up to either a CoCo 3 with 512K of memory or to one of Tandy's 1000 series computers with at least that much memory. If I move to a PC compatible, I will need to transfer my files to the compatible's word processor. I am able to convert my stored material to ASCII, but no one at any of the Tandy stores can tell me how to transfer my data to the PC compatible. Is there a way?*

Cleve Cunningham
Penn Valley, CA

℞ Using telecommunications programs such as *MikeyTerm* on the CoCo and *Procomm* on the Tandy, you can interconnect the two machines with a null-modem cable to facilitate the file transfer.

Commodore Comparison

A friend of mine has a Commodore 64 computer and swears by it. I swear by my CoCo 3. What are the similarities and differences between the two?

Michael Antonucci
Placentia, CA

℞ If I had a Commodore 64, I wouldn't swear by it. I'd swear *at it.* How can your friend tolerate taking 20 minutes to back up a full disk and using only peripherals, such as printers, from Commodore? The Commodore's weird daisy-chained serial peripheral connections were obsolete years ago.

Richard Esposito is the principal engineer for BDM Corporation. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.

Rich for CoCo's Taste!

I am forming a company and am looking for a laser printer that is compatible with both my CoCo 3 and an IBM machine. I have noticed a program sold by Microcom Software that claims to be able to transfer CoCo files to IBM format. What are this program's hardware requirements? Will I be able to use my Disk Scripsit *files on an IBM word processor like* Word Perfect? *Will a serial-to-parallel interface make my CoCo compatible with the new Tandy laser printer, TMP-1000? Finally, can I use a laser printer for desktop publishing or bit-image graphics?*

Mark Thompson
Richmond Hill, Toronto

℞ If you want a laser printer that will work with both your CoCo and an IBM computer, look for one that has as an option hardware compatibility with an Epson dot matrix printer. There are many on the market that do. If you want true laser-quality graphics (300-by-300 dots per inch), you will have to write your own graphics drivers. Until the price of laser printers drops considerably, they will remain too costly for most CoCo users.

Changing *DeskMate's* Default

I have a small problem with Radio Shack's DeskMate *(for the CoCo 2), which I run on my CoCo 3.* DeskMate *runs under OS-9's* Shell, *which is supplied with the software, and only offers two alternatives for printer baud rate: 1200 and 600. My printer (DMP-130) is set at 2400, and I would like to leave it there. I don't want to switch back and forth from one baud rate to another. My other software is set up for 2400 (although I could change it easily). Is there a way I can get around this software hang-up or change the* DeskMate *default to 2400 baud? I assume that this software is protected. I do not have OS-9, and I am not a hacker.*

Rev. Phillip Caruso

℞ I am not aware of any protected OS-9 software. In order to make any significant modifications to your *DeskMate* program, you will need the complete OS-9 operating system with its `Debug` and `Save` commands.

Mixing CoCos and PCs

At present I own a CoCo 2 with Multi-Pak Interface, FD 502 disk drive and OS-9 Level I. I run a home day-care business and am very new to computing. In the future, I will be working as a preschool teacher. Most centers use PC compatibles, and most educational software is written for them. Is there a way to upgrade my system to be able to use PC-compatible software, or would it be too costly? I am considering buying a CoCo 3 512K upgrade and a double-sided disk drive. Would this be a wise investment for the applications stated above?

Phyllis Lichi
Flagstaff, AZ

℞ While it might be possible to modify the CoCo's hardware to make it PC-compatible by adding an 8088 and support circuitry, such a modification would cost more than a low-cost PC clone. It is possible to transfer ASCII text files back and forth between the CoCo and PC clones, but I see no way to run such formidable PC programs as *Lotus 1-2-3* and *dBase III* on the CoCo.

Is RS-232 Available?

I recently got a copy of DeskMate *for my CoCo 2. All in all, it is satisfactory; however, one section of the program,* Telcom, *appears to be totally useless at the moment. This section of the program is written for the RS-232 Pak and Multi-Pak. While I can get a new Multi-Pak, the RS-232 Pak has been discontinued for some time. To further complicate the situation,* DeskMate *is an OS-9 package, and I know nothing about OS-9.*

Two things make me think that I may be able to make the Telcom *work with a built-in serial port. First, in his review of the program in the May '86 issue ["Accessible Applications," Page 219], Richard White mentions that while the program requires the RS-232 ROM Pak in the Multi-Pak, OS-9 owners with experience in customizing system disks can make it work through the CoCo serial port. Second, the instructions that come with* DeskMate *say that if you use an RS-232 Pak, type* `/t2` *at the prompt. The manual continues to explain that if you have other drivers connected and know their descriptors, you can specify the appropriate descriptor at this prompt. Is it possible to get one of these drivers without buying the entire OS-9 system? Could you print a fix for this problem?*

℞ Since the introduction of OS-9 Level II for the CoCo 3, some Radio Shack stores have been closing out copies of Level I at significant discounts. Although Tandy has discontinued the RS-232 Pak, CRC Computers, Inc. has picked up the slack with the Disto RS-232 SuperPack ($49.95), which is compatible with the original Tandy model.

Word Processors — CoCo's Favorites

My wife uses Bank Street Writer *at work on her Apple IIe, and she likes it a lot. Is there a similar program available for the CoCo?*

W.R. Simandl
Omaha NB

℞ *Bank Street Writer* is not available for the CoCo. The most popular word processors for the CoCo 1 and 2 are *Telewriter 64*, *Elite Word*, and *VIP Writer*.

Changing Drivers

I bought a 1200-baud modem from DAC Comm. While it works fine on my CoCo 3 with OS-9 Level II and an RS-232 pack, I can't get it to work with the CoCo 3's serial port. Can you help?

Edward A. Wolfe
Ridgewood NY

℞ The OS-9 Level II `/t1` driver is not capable of serial I/O to a modem. However, the `/t2` driver will work fine.

Don't Squeeze too Tight

I recently completed a large war Simulation. I developed it over a long period of time and always saved it in condensed format (tokenized BASIC). I needed memory to convert the program to ASCII so that I could upload it to the SIG. Therefore, I ran it through the Crush *utility (see "Hackers Haven," February '88, Page 154). When the utility had removed the spaces, my program looked just like the tokenized form, but the ASCII version would not run until I reinserted the spaces in the* `ON GOTO` *lines and some of the* `IF THEN` *lines. I am confused by this and would appreciate your help.*

Lloyd R. Kimball
Woodward, OK

℞ In a tokenized BASIC program, all of the key words are translated into special hexadecimal numbers. Once these key words are tokenized, the spaces separating them can be squeezed out, which allows the program to take up less RAM. Sometimes when you convert a squeezed program to ASCII, the tokenization routine in the CoCo's BASIC interpreter will tokenize incorrectly (or fail to tokenize) some BASIC key words.

Choose the Proper Driver

Do you know of a way to use Radio Shack's direct-connect modem pack (Cat. No. 26-2228) with the Telecom *section of* DeskMate 3 *for the CoCo 3?*

A. M. Fransen
Calgary, Alberta

℞ The device descriptor for the direct connect modem pack in OS-9 Level II is `/t3`. Select that descriptor in *DeskMate 3*.

ECB on a PC?

For business reasons, I've acquired an IBM clone. I do a lot of work on various word processing and spread sheet programs that must be compatible with the programs used by everyone else in the office. Unfortunately, the IBM clone has a BASIC program as part of the DOS that is not like the BASIC I learned with my CoCo 2. While I realize that BASIC is BASIC, I'd prefer to use CoCo 2's Extended Color BASIC on the clone. (I put in a lot of sweat to learn it.) Is there any way I can use the BASIC used by the CoCo, with the IBM clone?

Richard Overbey
Dyer, IN

℞ I know of no IBM-PC version of CoCo Extended Color BASIC. Tandy markets an Apple II emulator board for PC compatibles that allows them to run Apple programs, but there is no comparable CoCo emulator board.

Black and White Blues

In your August '88 column [Page 166], Charles Roman complained that some of his CoCo 2 programs displayed no color when run on a CoCo 3 with an RGB monitor. I have a Tandy CM-8 RGB monitor, which appears to have neither the composite video connection nor the CVBS button. Is there any solution to this same problem with my CoCo 3 and Tandy RGB monitor?

W. Tudor Morris
Middletown, OH

℞ While there is no universal solution to your problem (as there is with a monitor that has composite video), you can modify some programs to use `PMODE 3` instead of `PMODE 4`. A utility such as Microcom Software's *RGB Patch* will do this for many programs.

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.

A utility that takes the drudgery out of changing parameters — and offers a little incentive

Parameter Changes Made Easy

By Steve Goldberg

Changing the operating parameters of your printer or terminal has always been easy with the `Xmode` or `Tmode` utilities provided with your OS-9 operating system. However, to use a different disk drive with your system, you had to use alternate device drivers provided by Tandy. To do *that*, you had to configure an entirely new system disk. Enough is enough.

`Dmode`, a utility similar to `Xmode`, lets you change disk-drive parameters by typing the following:

`dmode /`*drive name options*

While typing `dmode` on the command line gives you a description of the syntax and options on the screen, entering `dmode`, followed by a disk-drive name (i.e., `dmode /d0`), displays the current parameters for that drive.

To change drive parameters, enter `dmode` and the drive name, followed by any or all of the following options (where *n* is a decimal number):

- *Tracks=n* changes the number of tracks on each side of the disk.
- *Sides=n* indicates the number of sides the drive can access.
- *Tpi=n* changes the number of tracks per inch used by your drive — 48 or 96. (The track density is 48 tracks per inch for 35- and 40-track drives, and 96 tracks per inch for 80-track drives.)
- *Step=n* changes the head-stepping rate for the drive. The constants *(n) are 3 for 6ms, 2 for 12ms, 1 for 20ms and 0 for 30ms.*

Steve Goldberg is a dentist who lives in Bethpage New York. Steve enjoys programming on his son's CoCo.

Listing 1: DMode

```
********************************************************
*
* DMODE - COPYRIGHT (c) 1988 by S. B. GOLDBERG
*
* Displays or changes the operating parameters
* for floppy disk drives
*
          ifpl
          use   /d0/defs/os9defs
          endc
          mod   len,name,prgrm+objct,reent+1,entry,dsiz
*
pointer   rmb   2   parameter pointer
modaddr   rmb   2   descriptor module address
temp      rmb   1   temporary storage
display   rmb   7   parameter display start
```

```
tks       rmb   9   track number display (1-99)
sds       rmb   7   side number display (1 or 2)
stp       rmb   6   step constant display (0-3)
tpi       rmb   3   tracks per inch (48 or 96)
          rmb   200   stack
          rmb   200   parameters
dsiz      equ   .
*
name      fcs   /Dmode/
          fcb   1   edition number
          fcc   /(c)1988 S.B.Goldberg/
*
syntax    fcc   "Use: dmode </device> [options]"
          fdb   $070a
          fcc   /     displays or changes floppy disk parameters/
          fcb   $0a
          fcc   /     sides=n   number of sides (1 or 2)/
          fcb   $0a
          fcc   /     step=n    head stepping rate (0-3)/
          fcb   $0a
          fcc   /     tpi=n     tracks per inch (48 or 96)/
          fcb   $0a
          fcc   /     tracks=n  number of tracks per side/
          fcb   $0d
params    fcc   /tracks=   sides=  step=  tpi=  /
          fdb   $0d00
**********************************
* DISPLAY DRIVE PARAMETERS
**********************************
showpram leay   display,u   parameter data area
          leax  <params,pcr   display address
pramloop lda    ,x+   display character
          sta   ,y+   to data area
          bne   pramloop   not done, move another
          ldy   modaddr   descriptor module address
          ldb   $18,y   track count
          lda   #'0   decimal tens column
          bra   tens   start calculation
addone    inca   increment tens column
tens      subb  #10   subtract 10
          bhs   addone   remainder, do again
          addb  #'0+10   decimal units column
          std   tks,u   track count to display data
          lda   $19,y   number of sides
          adda  #'0   make decimal
          sta   sds,u   side count to display area
          lda   $14,y   head step rate constant
          adda  #'0   make decimal
          sta   stp,u   constant to display area
          ldx   #$3438   48
          lda   $16,y   density flags
          bita  #%00000010   48 tracks/inch density?
          beq   savedens   yes, to display area
          ldx   #$3936   no, 96
savedens stx    tpi,u   track density to display area
          leax  display,u   display address
          lda   #1   standard output path
          bra   screen   display to screen and quit
```

To replace a single-sided 35-track drive with a two-sided 40-track drive, enter the following at the prompt:

```
dmode /d0 sides=2 tracks=40
```

`Dmode` recalculates the descriptor CRC, after changing the parameters. Therefore, to keep these changes, use `Cobbler` to build a new boot file with the altered descriptor.

You can also use `Dmode` to change drive parameters while you need a different format (e.g., you can use it to format a 35-track single-sided disk on a 40-track double-sided drive and then return to the original parameters).

Those using Level I OS-9 with a standard disk-driver module in place of `CCDisk` can also use `Dmode`. For those using OS-9 Level II without an assembler (an unfortunate omission), I've included the BASIC09 procedure `MakeDmode`, which will generate `Dmode` in your `CMDS` directory.

Finally, I have noticed that most 40-track drives can access 42 tracks with no problems. If you can successfully format a disk with 42 tracks, you pick up an additional 36 sectors on single-sided drives and 72 extra sectors on double-sided drives. Give it a try. You should be able to put those additional sectors to good use.

(Questions or comments concerning these utilities may directed to the author at 695 Plainview Rd., Bethpage, NY 11714. Please include an SASE when requesting a reply.) ☐

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```
*******************************
* DMODE SYNTAX PROMPT
*******************************
showerr  os9   f$perr   error number to screen
error    lda   #2   standard error path
         leax  syntax,pcr   syntax prompt
screen   bsr  print   to screen
         lbra  noerr   quit
print    ldy   #255   maximum length
printl   os9   i$writln   to screen
         lbcs  out   exit with error
         rts   return
*******************************
* LINK TO DEVICE DESCRIPTOR
*******************************
entry    tfr   x,y   parameter start
lowloop  lda   ,y+   parameter character
         cmpa  #$0d   done?
         beq   link   yes, link to descriptor
         ora   #%00100000   make lower case
         cmpa  #'a   alpah character?
         blo   lowloop   no, check again
         cmpa  #'z   alpha?
         bhi   lowloop   no, check again
         sta   -1,y   yes, save it
         bra   lowloop   check next character
link     ldd   ,x+   parameter characters
         cmpd  #$2f64   /d (floppy drive)?
         bne   error   no, prompt and quit
         clra   any type or language
         pshs  u   save U register
         os9   f$link   link for address
         bcs   showerr   quit with error and prompt
         stu   modaddr   save descriptor address
         puls  u   retrieve U register
         lda   ,x   next parameter character
         cmpa  #$0d   more parameters?
         lbeq  showpram   no, display current drive data


*******************************
* PROCESS DESCRIPTOR CHANGES
*******************************
         ldy   modaddr   descriptor address
look     stx   pointer   save parameter pointer
         lda   ,x+   parameter character
         cmpa  #$20   space?
         beq   look   yes, look again
         cmpa  #$0d   end of parameters?
         lbeq  fixcrc   yes, calculate CRC
         ldb   ,x+   next parameter character
         cmpd  #$7374   st ?
         beq   step   yes, goto step routine
         cmpd  #$7472   tr ?
         beq   track   yes, goto tracks routine
         cmpd  #$7369   si ?
         beq   side   yes, goto sides routine
         cmpd  #$7470   tp ?
         bne   passerr   no, prompt and quit
*
trakdens ldd   ,x++   next characters
         cmpd  #$693d   i= ?
         bne   passerr   no, prompt and quit
         ldd   ,x++   next parameter characters
         cmpd  #$3438   48 ?
         bne   bigdisk   no, continue
         lda   $16,y   density flags
         anda  #%11111101   clear track density flag
         bra   savit   save in descriptor
bigdisk  cmpd  #$3936   96 ?
         bne  passerr   no, prompt and quit
         lda   $16,y   density flags
         ora   #2   set 96 track/inch flag
savit    sta   $16,y   return to descriptor
         bra   look   look for more parameters
*
side     ldd   ,x++   next characters
         cmpd  #$6465   de ?
         bne   passerr   no, prompt and quit
         ldd   ,x++   next characters
         cmpd  #$733d   s= ?
```

```
passerr  bne   pramerr   no, prompt and quit
         bsr   bin   make number binary
         beq   pramerr   zero, prompt and quit
         cmpb  #2   >2 ?
         bhi   pramerr   yes, prompt and quit
         stb   $19,y   set side count
passlook bra   look   look for more parameters
*
step     ldd   ,x++   next characters
         cmpd  #$6570   ep ?
         bne   pramerr   no, prompt and quit
         lda   ,x+   next character
         cmpa  #'=   equals sign?
         bne   pramerr   no, prompt and quit
         bsr   bin   number to binary
         cmpb  #3   >3 ?
         bhi   pramerr   yes, prompt and quit
         stb   $14,y   step constant to descriptor
         bra   passlook   look for more parameters
*
track    ldd   ,x++   next characters
         cmpd  #$6163   ac ?
         bne   pramerr   no, prompt and quit
         ldd   ,x++   next characters
         cmpd  #$6b73   ks ?
         bne   pramerr   no, prompt and quit
         lda   ,x+   next character
         cmpa  #'=   equals sign?
         bne   pramerr   no, prompt and quit
         bsr   bin   number to binary
         beq   pramerr   zero, prompt and quit
         stb   $18,y   track count do descriptor
         bra   passlook   look for more parameters
*******************************
* DECIMAL TO BINARY CONVERSION
*******************************
bin      clr   temp   zero temporary storage
         bsr   convert   convert first digit
convert  lda   ,x   convert next digit
         suba  #'0   make binary
         bmi   back   not digit, return
         cmpa  #9   digit?
         bhi   back   no, return
         pshs  a   save digit
         lda   temp   previous count
         ldb   #10   multiply by 10
         mul
         addb  ,s+   add current value
         leax  1,x   bump pointer
back     stb   temp   save total
         rts   return
*******************************
* COMMAND LINE ERROR PROMPT
*******************************
pramerr  leax  <noproc,pcr   prompt address
         ldy   #pmptlen   prompt length
         lda   #2   standard error path
         lbsr  printl   prompt to screen
         ldx   pointer   parameter pointer
         lbsr  print   bad parameter to screen
         lbra  error   syntax prompt and quit
*******************************
* CALCULATE DESCRIPTOR CRC
*******************************
fixcrc   ldx   modaddr   descriptor address
         ldd   2,x   length of module
         subd  #3   less CRC bytes
         tfr   d,y   update size to Y register
         leau  d,x   CRC address to U register
         ldd   #$ffff   CRC initializing value
         std   ,u   initialize the
         sta   2,u   CRC accumulator
         os9   f$crc   do count
         bcs   out   exit with error
         com   ,u+   complement
         com   ,u+   the CRC
         com   ,u   bytes
noerr    clrb   clear error
out      ldu   modaddr   module address
         os9   f$unlink   unlink descriptor
         os9   f$exit   quit
```

```
*
noproc   fcc   /**** CAN'T PROCESS: /
pmptlen  equ   *-noproc
*
         emod
len      equ   *
end
```

Listing 2: MakeDMode

```
PROCEDURE MakeDmode
 0000      (* Generates the module "Dmode" in the CMDS directory *)
 0038      (* The "Attr" utility MUST be in execution direcrory *)
 006F      (* or in memory for MakeDmode to operate correctly *)
 00A4      DIM path,byt:BYTE
 00AF      DIM count:INTEGER
 00B6      CREATE #path,"/dd/cmds/dmode":WRITE
 00CF      FOR count=1 TO 735
 00E0        READ byt
 00E5        PUT #path,byt
 00EF      NEXT count
 00FA      CLOSE #path
 0100      SHELL "attr /dd/cmds/dmode e pe"
 011C      END
 011E      DATA 135,205,2,223,0,13,17,129,245,1,153,1,181,68,109
 014F      DATA 111,100,229,1,40,99,41,49,57,56,56,32,83,46,66
 0180      DATA 46,71,111,108,100,98,101,114,103,85,115,101,58,32,100
 01B1      DATA 109,111,100,101,32,60,47,100,101,118,105,99,101,62,32
 01E2      DATA 91,111,112,116,105,111,110,115,93,7,10,32,32,32,32
 0213      DATA 32,100,105,115,112,108,97,121,115,32,111,114,32,99,104
 0244      DATA 97,110,103,101,115,32,102,108,111,112,112,121,32,100,105
 0275      DATA 115,107,32,112,97,114,97,109,101,116,101,114,115,10,32
 02A6      DATA 32,32,32,32,115,105,100,101,115,61,110,32,32,32,110
 02D7      DATA 117,109,98,101,114,32,111,102,32,115,105,100,101,115,32
 0308      DATA 40,49,32,111,114,32,50,41,10,32,32,32,32,32,115
 0339      DATA 116,101,112,61,110,32,32,32,32,104,101,97,100,32,115
 036A      DATA 116,101,112,112,105,110,103,32,114,97,116,101,32,40,48
 039B      DATA 45,51,41,10,32,32,32,32,32,116,112,105,61,110,32
 03CC      DATA 32,32,32,32,116,114,97,99,107,115,32,112,101,114,32
 03FD      DATA 105,110,99,104,32,40,52,56,32,111,114,32,57,54,41
 042E      DATA 10,32,32,32,32,32,116,114,97,99,107,115,61,110,32
 045F      DATA 32,110,117,109,98,101,114,32,111,102,32,116,114,97,99
 0490      DATA 107,115,32,112,101,114,32,115,105,100,101,13,116,114,97
 04C1      DATA 99,107,115,61,32,32,32,115,105,100,101,115,61,32,32
 04F2      DATA 115,116,101,112,61,32,32,116,112,105,61,32,32,13,0
 0523      DATA 49,69,48,140,218,166,128,167,160,38,250,16,158,2,230
 0554      DATA 168,24,134,48,32,1,76,192,10,36,251,203,58,237,76
 0585      DATA 166,168,25,139,48,167,200,21,166,168,20,139,48,167,200
 05B6      DATA 28,142,52,56,166,168,22,133,2,39,3,142,57,54,175
 05E7      DATA 200,34,48,69,134,1,32,9,16,63,15,134,2,48,141
 0618      DATA 254,159,141,3,22,1,50,16,142,0,255,16,63,140,16
 0649      DATA 37,1,40,57,31,18,166,160,129,13,39,14,138,32,129
 067A      DATA 97,37,244,129,122,34,240,167,63,32,236,236,128,16,131
 06AB      DATA 47,100,38,203,79,52,64,16,63,0,37,192,223,2,53
 06DC      DATA 64,166,132,129,13,16,39,255,112,16,158,2,159,0,166
 070D      DATA 128,129,32,39,248,129,13,16,39,0,198,230,128,16,131
 073E      DATA 115,116,39,86,16,131,116,114,39,105,16,131,115,105,39
 076F      DATA 45,16,131,116,112,38,53,236,129,16,131,105,61,38,45
 07A0      DATA 236,129,16,131,52,56,38,7,166,168,22,132,253,32,11
 07D1      DATA 16,131,57,54,38,24,166,168,22,138,2,167,168,22,32
 0802      DATA 177,236,129,16,131,100,101,38,6,236,129,16,131,115,61
 0833      DATA 38,97,141,67,39,93,193,2,34,89,231,168,25,32,148
 0864      DATA 236,129,16,131,101,112,38,76,166,128,129,61,38,70,141
 0895      DATA 40,193,3,34,64,231,168,20,32,229,236,129,16,131,97
 08C6      DATA 99,38,51,236,129,16,131,107,115,38,43,166,128,129,61
 08F7      DATA 38,37,141,7,39,33,231,168,24,32,198,15,4,141,0
 0928      DATA 166,132,128,48,43,15,129,9,34,11,52,2,150,4,198
 0959      DATA 10,61,235,224,48,1,215,4,57,48,140,55,16,142,0
 098A      DATA 20,134,2,23,254,247,158,0,23,254,238,22,254,224,158
 09BB      DATA 2,236,2,131,0,3,31,2,51,139,204,255,255,237,196
 09EC      DATA 167,66,16,63,23,37,7,99,192,99,192,99,196,95,222
 0A1D      DATA 2,16,63,2,16,63,6,42,42,42,42,32,67,65,78
 0A4E      DATA 39,84,32,80,82,79,67,69,83,83,58,32,50,50,168
```

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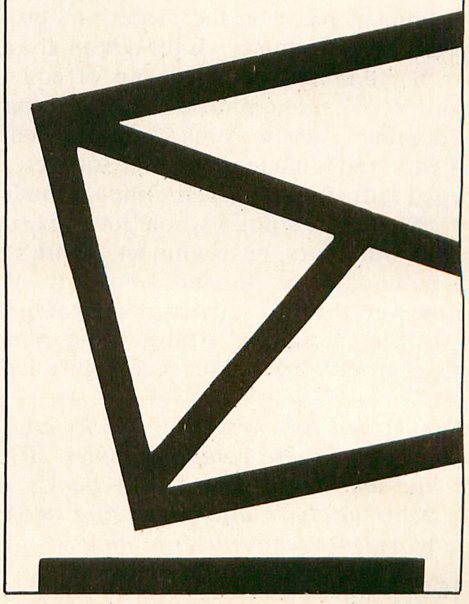

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The Puzzling Pentomino

By William Barden, Jr.
Rainbow Contributing Editor

While tooling along the 405 in California (if you consider grid-lock at 4 2/3 miles per hour *tooling*) I happened to glance at the bumper sticker of the 1976 Volvo ahead of me. It said "Pentomino Freaks Do It With Five!" Curious, I followed the car to the University of California, Irvine Campus. It turned into the faculty parking lot and parked. I followed it in, breaking through the lot's movable arm as I did.

I came up to the Volvo just as the driver was emerging. He was a slight, bearded, balding fellow, with layered chalk dust covering his somewhat threadbare sport coat.

"I couldn't help noticing your bumper sticker," I started.

"Oh, are you interested in polyominoes?" he asked, brightening.

"Polyominoes?" I frowned.

"Come up to my office. I'll give you a brief introduction."

We entered the mathematics department at the university and walked to a small office crammed full of books. I noticed a name on the door — R.E. Cursion, Ph.D. To my amazement, a CoCo 3 with assorted peripherals occupied a prominent place on the professor's desk. It was displaying multicolored squares on the screen at an alarming rate.

"Polyominoes are made up of equal-sized squares," he started. "A monomino is a single square. You know about a domino — it's two squares forming a one-by-two rectangle. A triomino is made up of three squares. A tetromino is made up of four squares. A *pentomino* is made up of five squares."

"Now there's not a whole lot of variation with monominoes, dominoes, or triominoes. There's only one shape with a monomino or domino, and only two with a triomino. However, the four squares of a tetromino can be formed into five different shapes." He drew a diagram on a scrap of printer paper from a DMP-130. (See Figure 1.)

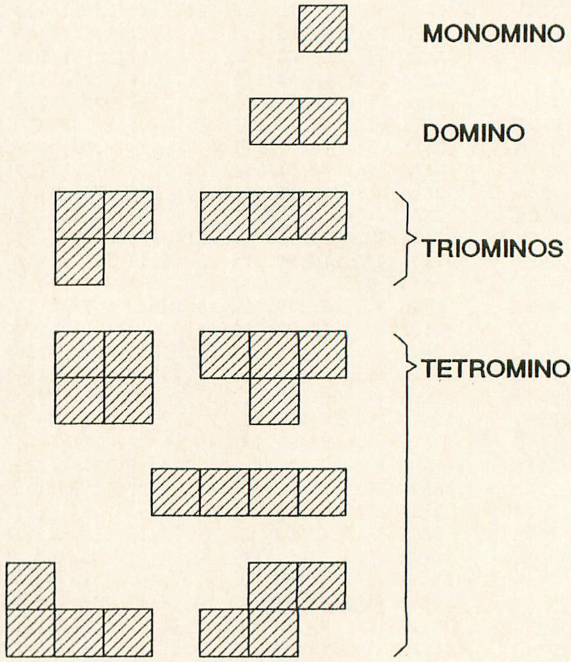

Figure 1: Monominoes to Tetrominoes

"That's four shapes if you assume that you can *rotate* or *flip over* the object," I offered.

"Precisely. When you have a pentomino — five squares — how many shapes can be made?" he asked.

"Ah well . . ."

"Here are five square pieces. Arrange them as you will," he said, handing over five squares.

"Let's see. There's a straight line. A kind of L. A T-shaped piece . . ." I labored on for two minutes or so.

"Ten pieces!" I announced triumphantly.

"Actually 12 — you missed these two. Here's a diagram,"

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

he said patiently, handing over a sheet with 12 pentomino figures. (See Figure 2.)

"But what can you do with these pentominoes?" I queried.

"What *can't* you do with them?" he countered. "There's been a lot of interest in them for many years. The problem of rearranging shapes is studied in *combinatorial geometry.* Back in the late 1800's, Dudeney, the puzzle expert, mentioned pentominoes. In the 1970's, Solomon W. Golomb wrote a book about polyominoes, appropriately called *Polyominoes* (Charles Scribner's Sons). Martin Gardner did a series of interesting columns on the subject in *Scientific American.* Pentominoes even figure prominently in Arthur C. Clarke's novel *Imperial Earth.*

He paused to let this brief history lesson sink in.

"Are you good at puzzles? he asked abruptly.

"Not bad," I lied.

"Can you, for example, arrange the 12 pieces into a 6-by-10 rectangle?"

"Well, let's see — there's five squares per pentomino and 12 pentominoes . . . making up 60 square units. Yes, that should be possible," I said.

"Well, do so," he twinkled, handing over a set of 12 pentominoes arranged in all the possible shapes.

I labored over the problem for five minutes, but couldn't get the pieces to fit.

"I don't know — it might be easier if this whole thing was computerized," I lamented.

"Funny you should mention that!" he exclaimed. "Are you familiar with the Color Computer?" he asked.

"Vaguely," I replied.

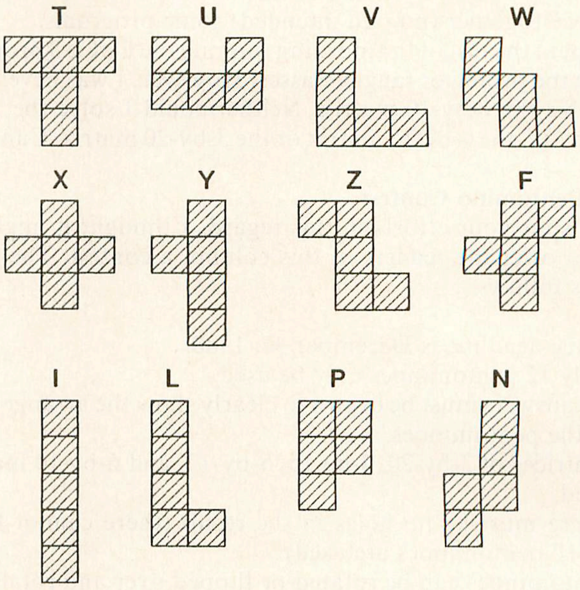

Figure 2: The 12 Pentominoes

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"Let me show you a program I did in BASIC to help arrange the pieces. It takes advantage of the CoCo 3's splendid color capability. I'm really pleased that I was able to use the CoCo to piece together (no pun intended) some programs."

I spent the rest of the morning running the CoCo 3 program while the professor taught classes. However, I was never able to solve the 6-by-10 matrix. Neither could I solve the 5-by-12 matrix, the 4-by-15 matrix or the 3-by-20 matrix. Can you?

The Pentomino Contest

To spur your efforts in this regard, I thought it might be fun to offer the readers of this column a contest. The rules are as follows:

- Entry deadline is December 31, 1988.
- Only 12 pentominoes may be used.
- All answers must be drawn to clearly show the arrangement of the pentominoes.
- Matrices of 3-by-20, 4-by-15, 5-by-12, and 6-by-10 may be used.
- There must be no holes in the result (there cannot be, if all 12 pentominoes are used).
- Pentominoes can be rotated or flipped over and rotated.
- Answers to the 4-by-15, 5-by-12, and 6-by-10 matrices count 10 points.
- Answers to the 3-by-20 matrix count 100 points.

Hint: There are literally thousands of answers to the 6-by-10 matrix, but only two to the 3-by-20 matrix.

In the spirit of fairness, a grand prize of $50 will go to the reader who first solves the puzzle (in case of a tie, the earliest postmarked entry wins) and has not seen this puzzle before. Two other prizes will go to runners-up, also readers who are unfamiliar with the problem. The next 50 readers with the highest scores will get mentioned in dispatches in my column. A special detailed mention will be given to readers who are pentomino experts, if any, and who can send significant results to me (such as all winning positions and the like).

Send all correspondence to:

William Barden
P.O. Box 3568
Mission Viejo, CA 92692

Running the Pentomino Program

Running *Pentomino* is easy. If keying it in, skip all comment lines. The program is designed for a CoCo 3 with a color display of 320-by-192. If you have a composite monitor (and not the RGB CM-8), you may need to change the color codes in lines 570 to 590 to something more palatable. If you choose to do so, change the second parameter after each `PALETTE` statement, using any codes from 0 to 63. (For example, change the original `PALETTE 3,54` (yellow) in the RGB version to `PALETTE 3,36` for composite.)

The program first prints the title and then asks for the size:

```
P E N T O M I N O E S 3=3X20;4=4X15;5=5X12;6=6X10:
```

Enter 3, 4, 5 or 6 to get the desired matrix. After entering the size, the message "Initializing" will appear on the screen, and there will be a short pause as the program initializes internal data.

Next, the screen will clear, and you will see a display similar to the one shown in Figure 3. On the screen, all 12 of the pentominoes are displayed in different colors, and the selected matrix is drawn above the pentominoes.

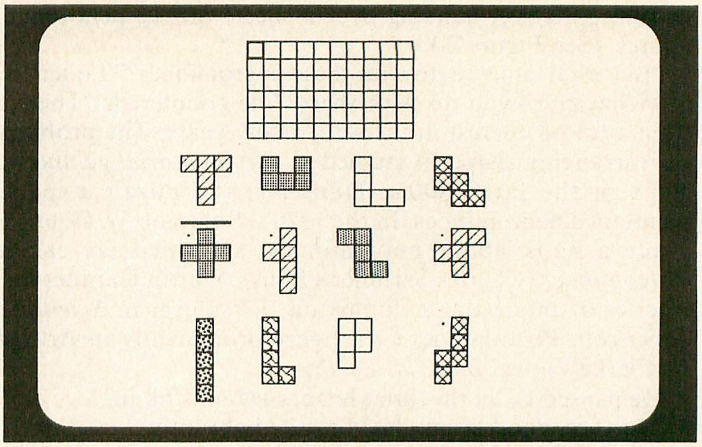

Figure 3

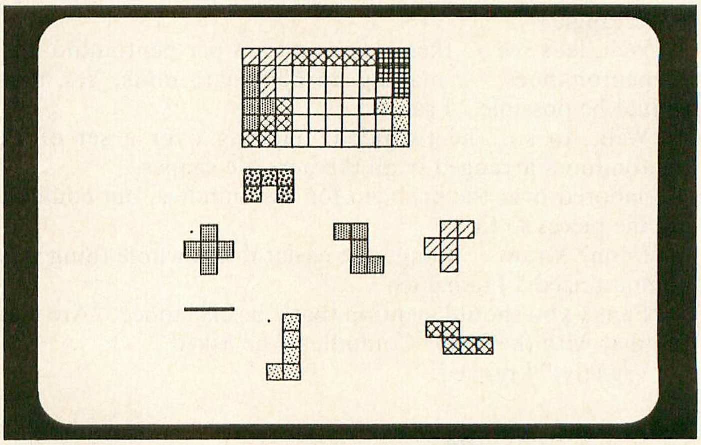

Figure 4

One of the 60 cells in the matrix is outlined in white. This outline marks the cell cursor position for placing the pentomino in the matrix. Some of the pentominoes have a small dot in the upper left corner. This dot corresponds to the left-hand corner of the matrix position. The pentominoes without a dot have a square in the upper left-hand corner. The cell cursor can be moved rapidly by using the up, down, left and right arrow keys.

The program allows you to select a pentomino by pressing the space bar. As you press the space bar, a white cursor under a pentomino moves to the right and down. You can select any of the 12 pentominoes in three seconds or less by pressing the space bar.

After selecting a pentomino, you can rotate it by pressing the ENTER key. Each time ENTER is pressed, the pentomino will rotate 90 degrees. Some pentominoes will flip over and you can then rotate them another four times. While a cross pentomino has only one position, the 'V' pentomino has four positions, and the 'F' pentomino has eight positions.

To move a pentomino onto the screen, move the white-cell cursor to the upper left-hand cell that corresponds to the selected pentomino and rotation. Then press I (Insert). The pentomino will be erased from its position and will be represented on the matrix in its original color. Move the cell cursor to a new position, and select a new pentomino and a rotation for that pentomino.

If you make a mistake, you can easily erase any pentomino in the matrix. Just move the cell cursor to any part of the pentomino you want to erase and press D (delete). The pentomino will be erased from the matrix and will reappear in its usual place.

By rotating, moving, and erasing pentominoes, you may find a combination of 12 pentominoes that fit on the screen. If you do, the screen will flash rapidly off and on and then display the message "Press any key to restart."

Be sure to record the position before you restart because the screen will be erased. Figure 4 shows a display after six pentominoes have been placed on the matrix.

How to Design a Pentomino Program

The first pentomino program I saw was done by James Garon in the early days of the Radio Shack TRS-80 Model I. As I recall, its operation was quite similar to Dr. Cursion's (no mean feat on the Model I). Dr. Cursion gave me a detailed explanation of his design efforts, and I'll reproduce them here — in my own words.

How Many Shapes Are There, Really?

The first key question is just how many shapes are involved? If you consider each pentomino separately, you can answer this by actually rotating and flipping each over. You can then count the number of different shapes. Since each pentomino is square, you need to rotate each 90 degrees at a time. Four rotations and you're back to square one. (Sorry, I couldn't resist that.) If you then flip the pentomino over, you may find another four shapes. Pentominoes have either one, two, four, or eight different shapes as shown below:

X = one shape
I = two shapes
T = four shapes
U = four shapes
V = four shapes
W = four shapes
Z = four shapes
Y = eight shapes
F = eight shapes
L = eight shapes
P = eight shapes
N = eight shapes

This means that there are 63 [1 + 2 + (5 x 4) + (5 x 8) = 63] different shapes in all. Using the F pentomino as an example, Figure 5 lists the eight shapes obtained by four rotations, a flip, and then more rotations.

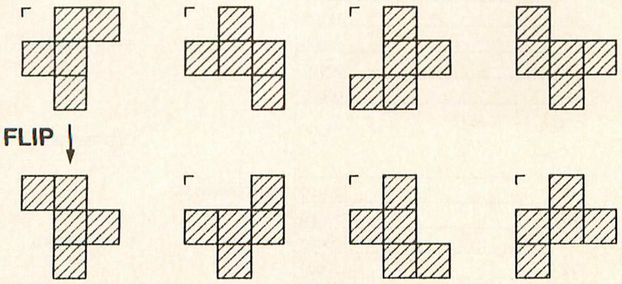

Figure 5: The Eight Configurations

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Coding the Shapes

Now that we know the number of shapes, how can we code them so the computer can understand them? There are many ways to do this. We could assume each pentomino consisted of a five-by-five matrix — 25 possible squares in all — and then code them up as a string. The first F position would then become the following five strings:

"-OO--" +
"OOO--" +
"-O---" +
"-----" +
"-----"

or a combined string of:
"-OO--OOO---O-------------"

This seems a little messy, since we'd have to be working with `MID$` statements to get at the characters within the strings.

Another way to code the shapes would be as a two-dimensional array such as `F( 5, 5 )`. The square within each pentomino would then be referenced by row, column.

Dr. Cursion chose a method that was geared to efficient access to the data without a lot of computation. As you can see from Listing 1, a good deal of the program consists of data values. Each line of data represents one pentomino configuration. Let's take the following `DATA` line as an example:

```
750 DATA &H1C,&H08,&H08,&H00,&H00
```

Each data value is one row of data for the pentomino, in binary. The following is the equivalent binary data for line 750:

&H1C	11100
&H08	01000
&H08	01000
&H00	00000
&H00	00000

You can see that the 1s in the data form a T-pentomino. The next `DATA` line is as follows:

```
800 DATA &H04,&H1C,&H04,&H00,&H00
```

When this arranged in binary, it looks like:

&H04	00100
&H1C	11100
&H04	00100
&H00	00000
&H00	00000

This is the 90-degree rotation of the T-shape. The other data values each use five data values to represent the 63 total shapes, for a total of 315 data values.

Storing the Data Values

Data values are notoriously hard to access, however. We don't want to have to *restore* (set the data pointer to the beginning of the first data) and then search sequentially through the list of data values for the proper pentomino data. Rather, we want to store the representations in some fast-access form. The form used in this program is an array.

`CP()` is a 480-element numeric array. Why 480 elements with 315 data values? If the pentominoes are numbered 0 through 11, and each space is allocated for the maximum of eight rotations found in some of the pentominoes, then we can rapidly access data for any pentomino by completing the following equation:

index of CP() = (pentomino # x 40) + (rotation number x 5)

Suppose we wanted data for Pentomino Number 5, Rotation 4 (counting from 0 for both the pentomino number and rotation). The start of the data would be the location determined by this equation:

(pentomino # x 40) + (rotation number x 5) = (5 x 40) + (4 x 5) = 220

There will be some gaps in the array since some pentominoes don't have eight rotations, but that's all right. With 12 pentominoes and 40 bytes for each, the number of elements required is 12 times 40, or 480. The array starts at 0, however, so the last element is 479.

To initialize the `CP()` array, we'll read five values at a time and store them in five consecutive array locations. Between data values we'll use flag values of `-N` to mark the pentomino number. For example, the fifth pentomino values start with data `-4,-4,-4,-4,-4`, the negation of the pentomino number minus one. (Five 0 values aren't used as these are legitimate *data* values; a negative is easier to detect.) The `CP()` array is initialized as shown in Figure 6.

The Main Matrix

The matrix used to hold the pentominoes exists in two forms — as an array of values and on the screen as a grid of lines and filled-in squares. The `MM()` array is an array of 60 elements, `MM(0)` through `MM(59)`. Although we could have made the array two-dimensional, it's probably easier to work with a linear array and convert a row and column to the proper element number.

The `MM()` array is initialized to -1, meaning that no cell holds any pentomino square. As pentominoes are filled into

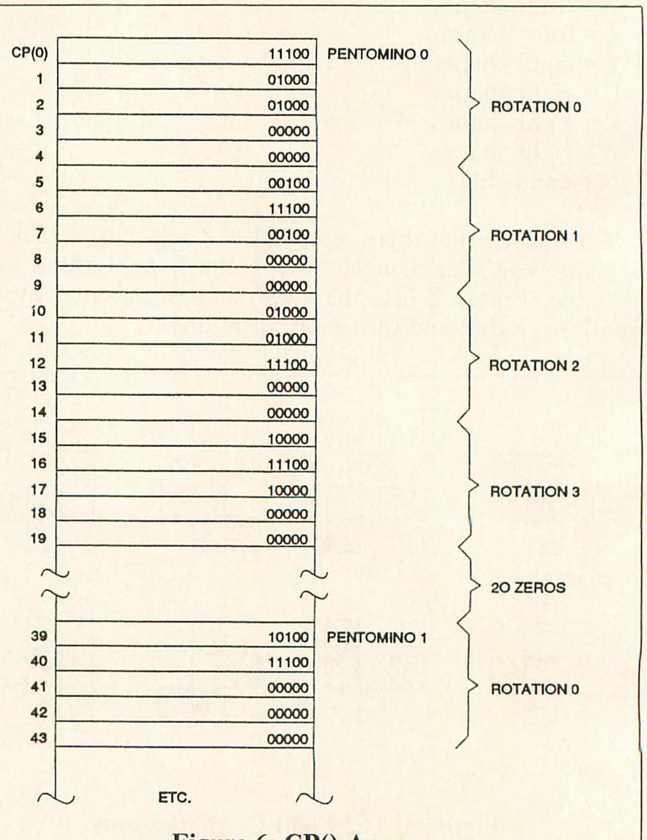

Figure 6: CP() Array

the array, the `MM( )` array elements will hold the number of pentomino and rotation. For example, if we store Pentomino Number 5, Rotation 4 in five squares (elements) of the `MM( )` array, we'll put the number of elements defined by the following equation into each of the five elements:

$$(\text{pentomino \#} \times 8) + \text{rotation \#} = (5 \times 8) + 4 = 44$$

This simplifies deletion of a pentomino. All we have to do is find all elements of the `MM( )` array that match a given pentomino code number and delete all occurrences.

Testing Whether a Pentomino Fits

The biggest problem in working with pentominoes and the display grid is determining whether a pentomino fits. The pentomino exists as a a set of 25 bit values in five data values as shown above. To test any five rows in the `MM( )` array, we'll convert the `MM` array data to an equivalent form. Suppose that we have the two pentominoes already in the `MM( )` array (and on the screen) and the cell cursor is positioned as shown in Figure 7. The procedure for building up the equivalent values would look something like the following:

```
FOR ROW = 0 TO 4
MASK = 16
TOTAL = 0
FOR COL = 0 TO 4
IF MM( ROW * 5 + COL ) -1 THEN TOTAL = TOTAL OR MASK
MASK = MASK / 2
NEXT COL
ZE( ROW ) = TOTAL
NEXT ROW
```

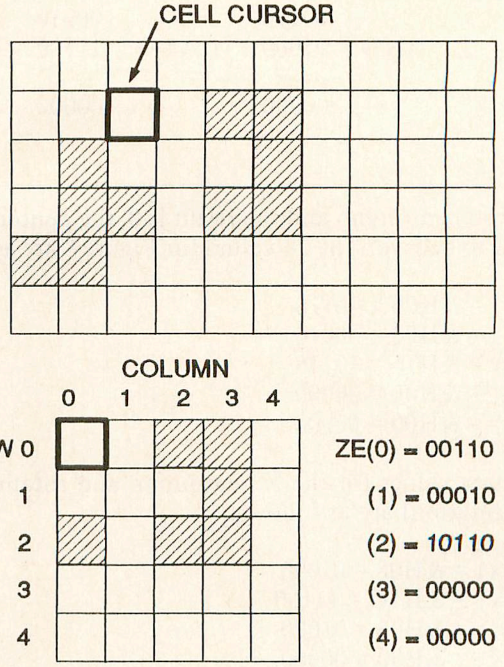

Figure 7: Testing for a Fit

At the end of this code, `ZE(0)` though `ZE(4)` hold five values corresponding to the data found in each row. The five values are actually binary values of `XXXXX` to match the `CP( )` array data. If these five values are ANDed with the `CP( )` data

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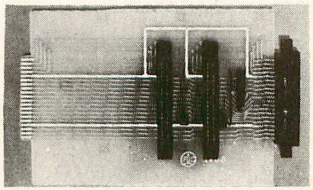

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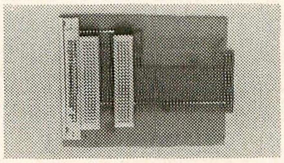

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```
      00110         00010         10110         00000         00000
AND   01000   AND   11100   AND   01000   AND   00000   AND   00000
      -----         -----         -----         -----         -----
      00000         00000         00000         00000         00000
```

Figure 8

for a given pentomino and the result is 0, the pentomino will fit. Hard to believe? The `ZE` values for Figure 8 are as follows:

`ZE(0)` = &H06 = 00110
`ZE(1)` = &H02 = 00010
`ZE(2)` = &H16 = 10110
`ZE(3)` = &H00 = 00000
`ZE(4)` = &H00 = 00000

The data values for the X pentomino and rotation 0 (the only X rotation) are as follows:

`CP(XX)` = &H08 = 01000
`CP(XX)` = &H1C = 11100
`CP(XX)` = &H08 = 01000
`CP(XX)` = &H00 = 00000
`CP(XX)` = &H00 = 00000

As the following shows, when these values are ANDed together, the result is 0. (ANDing is done on a bit-by-bit basis — two 0s produce a 0; one and zero produce 0; and one and one produce one.)

The method above needs some embellishments to check positions that are near the edges, but it's basically the one used in *Pentomino*.

Inserting a Pentomino

If a pentomino fits, then the 25 bits defining a pentomino (only five of which are ones) can be used to fill a matrix cell on the screen. Each of the five bytes defining a pentomino and its rotation are scanned from left to right. If the bit is a one, the corresponding cell on the screen matrix is painted with the same color as used in the display below the matrix. In addition, the five active `CP()` cells are set as follows:

(pentomino # x 8) + pentomino rotation #

Deleting a Pentomino

If a pentomino is to be deleted, the current cell contents under the cursor are read [(pentomino # x 8) + pentomino rotation #]. If this number is -1, the cell is currently empty (no pentomino present). If the cell is not a -1, all elements in the `MM()` array are scanned for the same number and a -1 is put into the five cells. In addition, the screen positions are painted with the background color. The pentomino is then rewritten in the area below the matrix so that it can be reused.

Postscript

As I left Dr. Cursion, he showed me a *second* Pentominoes program listing.

"I now have a program that will compute all possible combinations for the 3-by-20 matrix. However, I'm having some trouble with it."

"There must be quite a few combinations," I ventured.

"About 1,004,539,160,000,000. Unfortunately, the CoCo 3 has only gone through about 1,000,000 of them in one year. I'm thinking about buying a dozen more CoCos to gang up on the problem. I think if I increase the efficiency of my machine code and . . ."

I stole out the door as he muttered on.

See you next month with more CoCo topics. ☐

270	28	1890	151
470	58	2050	131
650	156	2170	164
820	155	2350	87
1000	252	2480	223
1180	102	2660	171
1370	26	2800	223
1520	93	2920	2
1710	199	END	43

Listing 1: `PENTPUZL`

```
100 ' PENTOMINOES
110 ' COPYRIGHT 1988 BY WILLIAM
BARDEN, JR.
120 '
130 '===========================
================================
================
140 '
150 ' DATA DICTIONARY
160 '
170 ' A1 - A5 = WORKING VARIABLE
S FOR READ OF DATA
180 ' BK = NORMAL BACKGROUND COL
OR
190 ' CC = COLOR CODE FOR DRAWIN
G PENTOMINOES IN MAIN MATRIX
200 ' CP() = 12 PENTOMINOES X 8
POSITIONS X 5 ROWS OF DATA
210 ' HL = HIGHLIGHT COLOR
220 ' I = CURRENT PENTOMINO HIGH
LIGHTED AND ACTIVE
230 ' J() = CURRENT ORIENTATION
FOR PENTOMINO I
240 ' MM() = MAIN MATRIX OF 60 C
ELLS ( 3 X 20, ETC.)
250 ' NO() = NUMBER OF UNIQUE OR
IENTATIONS FOR 12 PENTOMINOES
260 ' NP = NUMBER OF PENTOMINOES
 UNUSED
270 ' PN = PENTOMINO COLOR
280 ' ST = START OF MAIN MATRIX
IN X PIXELS
290 ' SZ = HEIGHT OF MAIN MATRIX
300 ' SX = WIDTH OF MAIN MATRIX
```

```
310 ' US() = MARKS PENTOMINO AVA
ILABLE ( 1 ) OR NOT ( 0 ) FOR 12
 P'S
320 ' X = CURRENT COLUMN POSITIO
N IN MAIN MATRIX
330 ' Y = CURRENT ROW POSITION I
N MAIN MATRIX
340 ' ZE() = EVALUATION MATRIX -
 HOLDS HASH FOR COMPARISON
350 ' ZA$ = WORKING STRING VARIA
BLE
360 ' ZA = WORKING VARIABLE
370 ' ZB = WORKING VARIABLE
380 ' ZI = WORKING INDEX
390 ' ZJ = WORKING INDEX
400 ' ZK = WORKING INDEX
410 ' ZP = WORKING INDEX
420 ' ZQ = WORKING INDEX
430 ' ZS = WORKING VARIABLE
440 ' ZX = WORKING INDEX FOR X
450 ' ZY = WORKING INDEX FOR Y
460 '
470 '===========================
================================
===============
480 '
490 PALETTE RGB
500 WIDTH 32
510 CLS
520 PRINT "P E N T O M I N O E S
 "
530 INPUT "3=3X20;4=4X15;5=5X12;
6=6X10:"; SZ
540 IF SZ < 3 OR SZ > 6 THEN GOT
O 530
550 SX = 60 / SZ
560 '--------------------
570 PALETTE 0,0:PALETTE 1,9:PALE
TTE 2,63:PALETTE 3,54:PALETTE 4,
36:PALETTE 5,27
580 PALETTE 6,45:PALETTE 7,38:PA
LETTE 8,18:PALETTE 9,2:PALETTE 1
0,60:PALETTE        11,35
590 PALETTE 12,10:PALETTE 13,59:
PALETTE 14,47
600 BK = 0: PN = 1: HL = 2
610 HSCREEN 2
620 HCOLOR PN, BK
630 HPRINT ( 9, 15 ), "INITIALIZ
ING..."
640 DIM CP( 479 ), NO( 11 ), J(
11 ), MM( 59 ), ZE( 4 ), US( 11
)
650 'SET NUMBER OF UNIQUE ORIENT
ATIONS FOR 12 PENTOMINOES
660 NO( 0 ) = 3: NO( 1 ) = 3: NO
( 2 ) = 3: NO( 3 ) = 3: NO( 4 )
= 0
670 NO( 5 ) = 7: NO( 6 ) = 3: NO
( 7 ) = 7: NO( 8 ) = 1: NO( 9 )
= 7
```

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```
680 NO( 10 ) = 7: NO( 11 ) = 7
690 ' INITIALIZE MAIN MATRIX TO
UNUSED
700 FOR ZI = 0 TO 59: MM( ZI ) =
 -1: NEXT
710 ' INITIALIZE AVAILABLE PENTO
MINOES
720 FOR ZI = 0 TO 11: US( ZI ) =
 1: NEXT
730 '
740 '============================
====================================
==============
750 '
760 ' DEFINE ORIENTATIONS
770 ' T=0
780 DATA -1,-1,-1,-1,-1
790 DATA &H1C,&H08,&H08,&H00,&H0
0
800 DATA &H04,&H1C,&H04,&H00,&H0
0
810 DATA &H08,&H08,&H1C,&H00,&H0
0
820 DATA &H10,&H1C,&H10,&H00,&H0
0
830 ' U = 1
840 DATA -2,-2,-2,-2,-2
850 DATA &H14,&H1C,&H00,&H00,&H0
0
860 DATA &H18,&H10,&H18,&H00,&H0
0
870 DATA &H1C,&H14,&H00,&H00,&H0
0
880 DATA &H18,&H08,&H18,&H00,&H0
0
890 ' V = 2
900 DATA -3,-3,-3,-3,-3
910 DATA &H10,&H10,&H1C,&H00,&H0
0
920 DATA &H1C,&H10,&H10,&H00,&H0
0
930 DATA &H1C,&H04,&H04,&H00,&H0
0
940 DATA &H04,&H04,&H1C,&H00,&H0
0
950 ' W = 3
960 DATA -4,-4,-4,-4,-4
970 DATA &H10,&H18,&H0C,&H00,&H0
0
980 DATA &H0C,&H18,&H10,&H00,&H0
0
990 DATA &H18,&H0C,&H04,&H00,&H0
0
1000 DATA &H04,&H0C,&H18,&H00,&H
00
1010 ' X = 4
1020 DATA -5,-5,-5,-5,-5
1030 DATA &H08,&H1C,&H08,&H00,&H
00
1040 ' Y = 5
1050 DATA -6,-6,-6,-6,-6
1060 DATA &H08,&H18,&H08,&H08,&H
```

```
00
1070 DATA &H04,&H1E,&H00,&H00,&H
00
1080 DATA &H10,&H10,&H18,&H10,&H
00
1090 DATA &H1E,&H08,&H00,&H00,&H
00
1100 DATA &H10,&H18,&H10,&H10,&H
00
1110 DATA &H1E,&H04,&H00,&H00,&H
00
1120 DATA &H08,&H08,&H18,&H08,&H
00
1130 DATA &H08,&H1E,&H00,&H00,&H
00
1140 ' Z = 6
1150 DATA -7,-7,-7,-7,-7
1160 DATA &H18,&H08,&H0C,&H00,&H
00
1170 DATA &H04,&H1C,&H10,&H00,&H
00
1180 DATA &H0C,&H08,&H18,&H00,&H
00
1190 DATA &H10,&H1C,&H04,&H00,&H
00
1200 ' F = 7
1210 DATA -8,-8,-8,-8,-8
1220 DATA &H0C,&H18,&H08,&H00,&H
00
1230 DATA &H08,&H1C,&H04,&H00,&H
```

```
00
1240 DATA &H08,&H0C,&H18,&H00,&H
00
1250 DATA &H10,&H1C,&H08,&H00,&H
00
1260 DATA &H18,&H0C,&H08,&H00,&H
00
1270 DATA &H04,&H1C,&H08,&H00,&H
00
1280 DATA &H08,&H18,&H0C,&H00,&H
00
1290 DATA &H08,&H1C,&H10,&H00,&H
00
1300 ' I = 8
1310 DATA -9,-9,-9,-9,-9
1320 DATA &H10,&H10,&H10,&H10,&H
10
1330 DATA &H1F,&H00,&H00,&H00,&H
00
1340 ' L = 9
1350 DATA -10,-10,-10,-10,-10
1360 DATA &H10,&H10,&H10,&H18,&H
00
1370 DATA &H1E,&H10,&H00,&H00,&H
00
1380 DATA &H18,&H08,&H08,&H08,&H
00
1390 DATA &H02,&H1E,&H00,&H00,&H
00
1400 DATA &H08,&H08,&H08,&H18,&H
```

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```
00
1410 DATA &H10,&H1E,&H00,&H00,&H
00
1420 DATA &H18,&H10,&H10,&H10,&H
00
1430 DATA &H1E,&H02,&H00,&H00,&H
00
1440 ' P = 10
1450 DATA -11,-11,-11,-11,-11
1460 DATA &H18,&H18,&H10,&H00,&H
00
1470 DATA &H1C,&H0C,&H00,&H00,&H
00
1480 DATA &H08,&H18,&H18,&H00,&H
00
1490 DATA &H18,&H1C,&H00,&H00,&H
00
1500 DATA &H18,&H18,&H08,&H00,&H
00
1510 DATA &H0C,&H1C,&H00,&H00,&H
00
1520 DATA &H10,&H18,&H18,&H00,&H
0
1530 DATA &H1C,&H18,&H00,&H00,&H
0
1540 ' N = 11
1550 DATA -12,-12,-12,-12,-12
1560 DATA &H08,&H08,&H18,&H10,&H
00
1570 DATA &H18,&H0E,&H00,&H00,&H
00
1580 DATA &H08,&H18,&H10,&H10,&H
00
1590 DATA &H1C,&H06,&H00,&H00,&H
00
1600 DATA &H10,&H10,&H18,&H08,&H
00
1610 DATA &H0E,&H18,&H00,&H00,&H
00
1620 DATA &H10,&H18,&H08,&H08,&H
00
1630 DATA &H06,&H1C,&H00,&H00,&H
00
1640 ' END = 12
1650 DATA -13,-13,-13,-13,-13
1660 '
1670 '===========================
================================
=============
1680 '
1690 ' FILL CP() WITH DATA
1700 FOR ZI = 0 TO 479: CP( ZI )
 = 0: NEXT
1710 ZI = 0
1720 RESTORE
1730 READ A1, A2, A3, A4, A5
1740 IF A1 < 0 THEN ZI = ( - A1
- 1 ) * 40: IF ZI <> 480 THEN GO
TO 1730 ELSE            GOTO 1810
1750 CP( ZI ) = A1: CP( ZI + 1 )
 = A2: CP( ZI + 2 ) = A3
1760 CP( ZI + 3 ) = A4: CP( ZI +
 4 ) = A5
1770 ZI = ZI + 5
1780 GOTO 1730
1790 '--------------------
1800 ' NOW HAVE DATA STORED FOR
FAST ACCESS - START PROGRAM
1810 NP = 12
1820 HCLS
1830 FOR ZI = 0 TO 11: ZJ = 0: H
COLOR ZI + 3, BK: GOSUB 2250: HC
OLOR PN,BK: NEXT
1840 ZI = 0: HCOLOR HL, BK: GOSU
B 3020: HCOLOR PN, BK
1850 I = O
1860 FOR ZK = 0 TO 11: J( ZK) =
0: NEXT
1870 GOSUB 2390
1880 X = 0: Y = 0: HCOLOR HL, BK
: GOSUB 2460: HCOLOR PN, BK
1890 '--------------------
1900 ' READ KEYBOARD AND TAKE AC
TION
1910 ZA$ = INKEY$: IF ZA$ = "" T
HEN GOTO 1910
1920 IF ZA$ <> CHR$( 13 ) THEN G
OTO 1970
1930 IF I = 4 THEN GOTO 2100
1940 J( I ) = J( I ) + 1: IF J(
I ) > NO( I ) THEN J( I ) = 0
1950 HCOLOR I + 3, BK: ZI = I: Z
J = J( I ): GOSUB 2250: HCOLOR P
N, BK
1960 GOTO 2100
1970 IF ZA$ <> " " THEN GOTO 203
0
1980 ZI = I: HCOLOR BK, BK: GOSU
B 3020: HCOLOR PN, BK
1990 I = I + 1: IF I > 11 THEN I
 = 0
2000 IF US( I ) = 0 THEN GOTO 19
90
2010 HCOLOR HL, BK: ZI = I: GOSU
B 3020: HCOLOR PN, BK
2020 GOTO 2080
2030 IF ( ZA$ = CHR$( 8 ) OR ZA$
 = CHR$( 9 ) OR ZA$ = CHR$( 10 )
 OR ZA$ =            CHR$( 94 )
) THEN GOSUB 2460 ELSE GOTO 2100
2040 IF ZA$ = CHR$( 8 ) THEN X =
 X - 1: IF X < 0 THEN X = ( 60 /
 SZ ) - 1: GOTO 2080 ELSE GOTO 2
080
2050 IF ZA$ = CHR$( 9 ) THEN X =
 X + 1: IF X > ( 60 / SZ ) - 1 T
HEN X = 0: GOTO          2080 ELSE G
OTO 2080
2060 IF ZA$ = CHR$( 10 ) THEN Y
= Y + 1: IF Y > SZ - 1 THEN Y =
0: GOTO 2080             ELSE GOTO 2
080
2070 Y = Y - 1: IF Y < 0 THEN Y
= SZ - 1: GOTO 2080 ELSE GOTO 20
```

```
80
2080 HCOLOR HL, BK: GOSUB 2460:
HCOLOR PN, BK
2090 GOTO 2170
2100 IF ZA$ <> "I" THEN GOTO 216
0
2110 GOSUB 2640
2120 IF NP <> 0 THEN GOTO 2170
2130 FOR ZI = 1 TO 10: PALETTE 0
, 9: PALETTE 1,0: PALETTE 0,0: P
ALETTE 1,9:          NEXT ZI
2140 HPRINT ( 8, 24 ), "PRESS AN
Y KEY TO RESTART"
2150 ZA$ = INKEY$: IF ZA$ = "" T
HEN GOTO 2150 ELSE GOTO 490
2160 IF ZA$ = "D" THEN GOSUB 285
0
2170 GOTO 1910
2180 '===========================
=================================
==============
2190 ' SUBROUTINE TO CLEAR 5 BY
5 MATRIX
2200 ZX = ( ZI - INT( ZI / 4 ) *
 4 ) * 56 + 64: ZY = INT( ( ZI /
 4 ) ) * 36 + 84
2210 HLINE ( ZX, ZY ) - ( ZX + 3
9, ZY + 29 ), PRESET, BF
2220 RETURN
2230 '===========================
=================================
==============
2240 ' SUBROUTINE TO WRITE PENTO
MINO TO LEGEND AREA
2250 GOSUB 2200
2260 ZK = ZI * 40 + ZJ * 5
2270 FOR ZQ = 0 TO 4
2280 ZA = CP( ZK + ZQ )
2290 ZM = 16
2300 FOR ZP = 0 TO 4
2310 IF ( ZA AND ZM ) <> 0 THEN
HLINE( ZX + ZP * 8, ZY + ZQ * 6
) - ( ZX + ZP *       8 + 7, ZY +
 ZQ * 6 + 5 ), PSET, BF
2320 ZM = ZM / 2
2330 NEXT
2340 NEXT
2350 HSET ( ZX + 4, ZY + 3 )
2360 RETURN
2370 '===========================
=================================
==============
2380 ' SUBROUTINE TO DRAW MAIN M
ATRIX
2390 IF SZ = 3 THEN ST = 80 ELSE
 IF SZ = 4 THEN ST = 100 ELSE IF
 ST = 5 THEN          ST = 112 EL
SE ST = 120
2400 ZI = 60 / SZ
2410 FOR ZJ = 0 TO ZI: HLINE ( S
```

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```
T + ZJ * 8, 24 ) - ( ST + ZJ * 8
, 24 + SZ * 6), PSET: NEXT
2420 FOR ZJ = 0 TO SZ: HLINE ( S
T, ZJ * 6 + 24 ) - ( ST + ZI * 8
, ZJ * 6 + 24 ),      PSET: NEXT
2430 RETURN
2440 '===========================
=================================
==============
2450 ' SUBROUTINE TO HIGHLIGHT O
R UNHIGHLIGHT CURRENT POSITION
2460 HLINE ( ST + X * 8, Y * 6 +
 24 ) - ( ST + X * 8 + 8, Y * 6
+ 24 + 6 ),             PSET, B
2470 RETURN
2480 '===========================
=================================
==============
2490 ' SUBROUTINE TO TEST FIT IN
 MAIN MATRIX - RETURNS 0 IF FIT,
 <> 0 IF NOT
2500 FOR ZY = Y TO Y + 4
2510 IF ZY > SZ - 1 THEN ZE( ZY
- Y ) = &H1F: GOTO 2560
2520 ZE( ZY - Y ) = 0: ZM = 16:
ZA = 0
2530 FOR ZX = X TO X + 4: IF ZX
>= SX THEN ZA = ZA + ZM ELSE IF
MM( ZY * SX +           ZX ) <> -1
THEN ZA = ZA + ZM
2540 ZM = ZM / 2: NEXT ZX
2550 ZE( ZY - Y ) = ZA
2560 NEXT ZY
2570 ZS = 0
2580 FOR ZI = 0 TO 4
2590 ZS = ZS + ( ZE( ZI ) AND CP
( I * 40 + J( I ) * 5 + ZI ) )
2600 NEXT ZI
2610 RETURN
2620 '===========================
=================================
==============
2630 ' SUBROUTINE TO INSERT PENT
OMINO IN MAIN MATRIX, DELETE FRO
M AVAILABLE
2640 GOSUB 2500: IF ZS <> 0 THEN
 GOTO 2820
2650 ZI = I: GOSUB 2200
2660 US( I ) = 0
2670 HLINE ( X * 8 + ST, Y * 6 +
 24 ) - ( X * 8 + ST + 8, Y * 6
+ 24 + 6 ),             PSET, B
2680 FOR ZY = 0 TO 4
2690 ZM = 16
2700 ZA = CP ( I * 40 + J( I ) *
 5 + ZY )
2710 FOR ZX = 0 TO 4
2720 IF ( ZA AND ZM ) <> 0 THEN
HPAINT( ( X + ZX ) * 8 + ST + 4,
 ( Y + ZY ) * 6      + 24 + 3 ),
 I + 3 ,PN: MM( ( Y + ZY ) * SX
+ X + ZX ) = I * 8 + J( I )
2730 ZM = ZM / 2
2740 NEXT ZX
2750 NEXT ZY
2760 ZI = I: HCOLOR BK, BK: GOSU
B 3020: HCOLOR PN, BK
2770 NP = NP - 1: IF NP = 0 THEN
 GOTO 2820
2780 I = I + 1: IF I > 11 THEN I
 = 0
2790 IF US( I ) = 0 THEN GOTO 27
30
2800 HCOLOR HL, BK: ZI = I: GOSU
B 3020: HCOLOR PN, BK
2810 HCOLOR HL, BK: HLINE ( X *
8 + ST, Y * 6 + 24 ) - ( X * 8 +
 ST + 8, Y * 6       + 24 + 6 ),
 PSET, B: HCOLOR PN, BK
2820 RETURN
2830 '===========================
=================================
==============
2840 ' SUBROUTINE TO DELETE PENT
OMINO FROM MAIN MATRIX, RESTORE
IN AVAILABLE
2850 ZB = MM( Y * SX + X )
2860 IF ZB = -1 THEN GOTO 2990
2870 ZI = INT( ZB / 8 ): ZJ = ZB
 - ZI * 8: HCOLOR ZI + 3, BK: GO
SUB 2250:             HCOLOR PN,B
K
2880 US( ZI ) = 1
2890 NP = NP + 1
2900 FOR ZK = 0 TO 59
2910 IF MM( ZK ) <> ZB THEN GOTO
 2980
2920 MM( ZK ) = -1
2930 ZX = ( ZK - INT( ZK / SX )
* SX ) * 8 + ST + 1
2940 ZY = INT( ZK / SX ) * 6 + 2
4 + 1
2950 HCOLOR BK, BK
2960 HLINE ( ZX, ZY ) - ( ZX + 6
, ZY + 4 ), PSET, BF
2970 HCOLOR PN, BK
2980 NEXT ZK
2990 RETURN
3000 '===========================
=================================
==============
3010 ' SUBROUTINE TO UNDERLINE A
CTIVE PENTOMINO
3020 ZX = ( ZI - INT( ZI / 4 ) *
 4 ) * 56 + 56: ZY = INT( ZI / 4
) * 36 + 117
3030 HLINE ( ZX, ZY ) - ( ZX + 3
9, ZY ), PSET
3040 RETURN
3050 ' ==========================
=================================
==============
```

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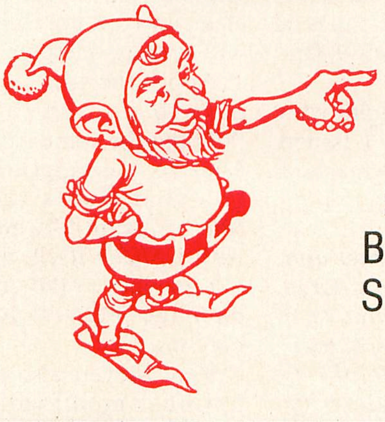

For Naughty
Boys and Girls
See Page 115.

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KISSable OS-9

OS-9 Level II

Better Tools Are Here!

By Dale L. Puckett
Rainbow Contributing Editor

Things are really getting exciting as we approach the new year. In fact, I can't keep up with all the improvements and additions to OS-9. As we wrap up the year, let's look back at a few of the recent accomplishments of the hacker community — especially the fine OS-9 Level II improvements made by Ron Lammardo, Kent Meyers, Kevin Darling and other hard chargers in the OS-9 Users Group.

Lammardo released *ShellPlus* 2.0 in late August; his enhancements move us closer to UNIX. Additionally, Kent Meyers released an `ipatch` file that fixed a few unresolved bugs in *GShell+*. While I was busy installing the new system modules from the guys in the OS-9 Users Group, Bill Brady sent me the Beta version of *WizPro*. This program gets better every time I see it. Speaking of communications programs . . . Merle Kemmerly has been working on a new package named *TelStar*. He's been posting updates several times a week on RAINBOW's Delphi OS-9 Online SIG.

I also heard from Brian Wright, who called to answer a challenge I issued nearly two years ago when I asked readers why OS-9 had no *ThinkTank*. Wright sent me his version through Delphi Mail. If this trend keeps up, we'll all have the application and system software we need to put our CoCo 3, OS-9 Level II systems to work.

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP: on packet-radio, K0HYD @ N4QQ; on GEnie, D.PUCKETT2; and on CIS, 71446,736.

GShell+ News

You'll find the following three `ipatch` files in Kent Meyers' archive file:

* `GShell24a.ipc`
* `SCfkd.wp.ipc` — for Kevin Darling's modified `SCF`
* `SCfstd.wp.ipc` — for the standard version of `SCF`

To install these patches, run the `ipatch` utility, which is available on RAINBOW's Delphi OS-9 Online SIG as well as the OS-9 SIGs on CompuServe and GEnie. Apply `GShell24a.ipc` to *GShell+* Version 1.24. While the patches clean up a few unresolved bugs, *GShell+* will operate the same after it is patched.

Apply the files `SCfkd.wp.ipc` and `SCfstd.wp.ipc` to Kevin Darling's `SCF` and the standard `SCF`, respectively. They fix a disappearing-window problem that limits the usefulness of *Shell+* Version 2.0's no-block feature. As with *GShell+* itself, you must make the `SCF` patches in the original `GSHELL.AR` package before you install these patches.

Kent Meyers also passed along a few optional modifications that can be added to *GShell+* Version 1.24 or 1.24a. For example, you may want to return to the white (PRN #0) border on the *GShell+* windows. Personally, I like the black borders Kent used in this version, but to each his own. The following are the patch locations:

Location	Now	New
$016C	$02	$00
$2939	$02	$00

If you would like to change *GShell*'s standard white-on-blue overlay window to blue-on-white, use the following patch:

Location	Now	New
218F	$6E	$6C
$2192	$6C	$6E
$218D	$01	$02 or $03 (Foreground Palette Register)

If you would like *GShell+* to start up in an 80-column window rather than the standard 40-column window, install this patch:

Location	Now	New
3547	$06	$07 for 80 columns $08 for 16 colors

ShellPlus Version 2.0

Kent Meyers really started something when he released *Shell+* Version 1.0 early this year. It wasn't long before Kevin Darling and Ron Lammardo jumped on the bandwagon and Release 1.1 was born. During the summer, Ron kept hacking; and just prior to my writing this, Version 2.0 was born. Lammardo's improvements read like the who's who in a UNIX shell:

- Current date/time is displayed when a shell starts
- Current date/time can be used in a shell prompt
- Memory scripts have been added
- Shell now has variables (`VAR.#`, `%#`, `%*`, `VAR.?`, `V`, `-V`)
- `Path=` and `Pause` commands have been added
- Shell now has `If`/ `Then`/ `Else`/ `Endif`/ `Fi`/ `Clrif` statements, `Goto`/ `Onerr Goto` and `*`
- Wildcards may be used
- Path redirection (`Z=`, `R=`) has been added
- Security has been improved with `@` removal except for User 0
- Logging (`L`/`-L`) has been added
- Shell Subs (`%%#`) have been added
- User start-up execution is possible
- Several bugs have been fixed

Some of the enhancements in *Shell*+ were inspired by other utilities, most notably, *GoTo* by Kevin Darling, *GPere* and *NoBlock* by Kent Meyers, *Wildcards* by S. Turner, and *Logging* by Carl Kreider.

I don't have room to detail all the *ShellPlus* Version 2.0 enhancements here, but I'll try to spotlight many of the important features.

What is No-Block?

Do you remember trying to send a message to a partner working on another terminal? When you typed `echo whats new /t2` from `Term`, your message would wait around until the other shell received keyboard input. While it was waiting, `Term` (and you) would be hung up. The other shell was doing a read call and this blocked out any other input.

ShellPlus Version 2.0 runs in *no-block mode*. It solves the hang-up problem by putting itself to sleep while waiting for keyboard input. This lets other input get through. However, if you don't like this mode, the no-block feature can be turned off by running a `modpatch` file named `Noblock.off.scr` and then saving the shell. Additionally, it can be turned back on by running another modpatch file.

Scripts in your current execution directory, a favorite *Shell*+ feature, remain in Version 2.0 and memory scripts have been added. The shell now searches your memory, current execution directory and current data directory in that order.

Here's a sample script called `FSM` that opens a VDG screen on Window `/w6` and runs *Flight Simulator*. When you exit `FS`, the script changes the VDG screen on Device `/w6` back to a window in the following manner:

```
* FSM - Procedure Command File
stored in CMDS to start FS
xmode /w6 type=1; display c>/w6
chd /dd/games/fs
fs <>>>/w6; xmode /w6 type=80&
```

In the *Shell*+ prompt, an open parenthesis, '(', will display the current date and a closed parenthesis, ')', will show the current time. For example, `p=)[@]:` will print a prompt like "18:30:14 [Term]:" on your screen.

Version 2.0 of *Shell*+ makes it easy to start up new shells with custom prompts. You just pass them as parameters. For example, to start a shell on Device `/w4` and alter the prompt, you could type the following:

```
shell p=OS9/@? i=/w4&
```

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The prompt for the new shell running in Window Device `/w4` would look like "OS9/W4?"

Redirecting Paths in Shell Scripts

The statement z=*path* may now be used in a shell script when you want to change your current data directory or path, or change a variable that you want to live after the shell script ends. In addition, you can use r=[redirect chars] *path* to redirect a specified path to the standard input. A few examples follow:

Command line:	Description:
`r=>/w`	Redirects output path to next window
`r=<>>>/w`	Redirects standard input, output and error path to next window
`r=</h0/shell script`	Redirects standard input path from `h0/shellscript`

If the last line in the file `/h0/shellscript` is `i+/1`, the shell script will end with all settings preserved.

What Can Memory Scripts Do for Me?

If you are running on a floppy disk-based system, the question — where did I put that shell script? — is probably too familiar. To make your life easier, *Shell*+ now allows a data module (either resident in memory or stored in an execution directory file) to be executed as if it were a text file containing a shell script. Therefore, you can convert all your favorite shell scripts to data modules, pack them into a single file and load them into memory at start-up. After you do this, you will have access to all those shell scripts without accessing your floppy disk drive. Since shell scripts are generally small, you will be able to merge plenty of them into an 8K block.

Logging and Variables

When you turn on the logging feature of *Shell*+ Version 2.0, every non-comment line is written to a log file named `/dd/log/u`*xxx*. The *xxx* represents the last three digits of your User ID, prefixed by the date and time you processed the line. You can turn logging on permanently with a modpatch script included with the *Shell*+ upgrade.

With *Shell*+, you can now use up to 10 shell variables. They live as long as the shell is running and can be used in command lines. To load variables, type `var .1` or `var=`*"yourdata"*. The first code takes up to 80 characters from the standard input path. The second loads the data between two quote characters.

The following is a sample shell script that you could use to call the OS-9 assembler. You would then supply the input when you execute the shellscript.

```
* Comp - generic assembler call
file
prompt Program to ASM :
var.0
var.3="/dd/output"
t
asm #16k %0 L O=/dd/asm/obj/%0 >-
%3
errchk <%3
unload %0
load /dd/asm/obj/%0
```

When you run this script, you should see something like this:

```
Program to ASM ?
testprog (User types this line)
asm #16k testprog L O=/d/asm/
obj/testprog >/dd/output
errchk </dd/output
unload testprog
load /dd/asm/obj/testprog
```

Shell+ maintains two sets of variables — *user variables*, which you can set and examine, and *shell sub variables*, which can only be set by a shell sub. The following example shows how you can use shell sub variables to display the current month:

```
echo The current month is %%0
```

Perhaps you would like to run a particular program in a specific month. To do so, enter the following:

```
If %%0=July
Then
(action line goes here)
Endif
```

Shell variables can also be incremented or decremented by one with the `Inc.#` / `Dec.#` statements. Additionally, a new `Pause` statement lets you display a message and then wait for a key press or mouse click (e.g., "pause 'Press any key when ready'").

Wildcards

Shell+ expands wildcards *after* variables but before any other line checking. If you want to expand your wildcards, you must type a colon, ':', as the first character on your line. However, if you want *Shell*+ to expand wildcards permanently, you can run the modpatch script, `Wild.on.scr`, and save the shell. *Shell*+ recognizes the following wildcards:

Wildcard	Description
`*`	Match any string of characters
`?`	Match any single character
`[a-z]`	Match a single character in the range within brackets

Now let's look at some examples that use wildcards with `Fstat`. (Note: At least one space must follow any wildcard. For this reason, `Fstat *!` will not work while `Fstat * !` will.)

`Fstat *`	Runs `Fstat` on every file in the current data
`Dir Fstat [c-g]*`	Runs `Fstat` on every file beginning with `c` through `g`
`Fstat she*`	Runs `Fstat` on every file starting with `she`
`Fstat * .a`	Runs `Fstat` on files ending with `.a`

Condition Testing

The `If/ Then/ Else/ Endif/ Fi/ Clrif` statements are now built into *Shell*+ Version 2.0. Therefore, you can check the following conditions in your shell scripts:

`If -Y`	Read one character from standard input (Y = true, N = false)
`If -F` *<file>*	True if file exists and is a file
`If -R` *<file>*	True if file exists and is readable
`If -W` *<file>*	True if file exists and is writable
`If -E` *<file>*	True if file exists in execution directory
`If -D` *<file>*	True if file exists and is a directory

The following operators may also be used:

=	True if left side is equal to right side
<	True if left side is less than right side
>	True if left side is greater than right side
<= or =<	True if left side is less than or equal to right side

`>=` or `=>`	True if left side is greater than or equal to right side

You may use the plus symbol (+) to right-justify and zero-fill when you need accurate numeric checks:

```
if 09<010   false if 09>010   true
if +09<010  true  if +09>010  false
```

When a condition is true, the lines that follow it are processed until an optional `Else` statement is encountered. `If` statements can be nested up to 255 deep. The word `Then` is optional and is ignored when present.

By using the new *Shell*+ `Path=` command, you can tell the shell to search alternate directories when it cannot find a file in your current execution directory. If you have only floppy disk drives and your space is limited, you will find this command useful because it will let you spread your commands across two or more disks. These paths are retained when you fork a sub shell.

A useful shell script is probably the best way to demonstrate the power of `Shell+` Version 2.0. OS-9 Level II window control is something we would all like to simplify, and the following sample script (shown in Figure 1) from Steve Clark may help. The script sets up several different window types. Some work in the current screen; others create new windows. It allows multiple results by nesting the `If/Then` statements and using only one `Endif`. It uses Fred Sawtelle's *WMode* utility. It works best — and faster — if you keep echo, display, and prompt modules in memory.

That's a look at the high points of *Shell*+ Version 2.0. Be sure to get a copy from your favorite online data library. You'll discover many additionally pleasant surprises when you do.

A Patch to Improve *XED*

I received an answer to an earlier challenge and several additional tidbits from Brian C. White of Esterhazy, Saskatchewan. White's answer to my two-year-old challenge for an OS-9 *ThinkTank* came via Delphi Mail this month.

White not only has a *ThinkTank* for OS-9, he wrote it. White explained, "I have no knowledge of an outline processor in any way resembling what you described in that column. I have never seen *ThinkTank*, nor have I met anyone else who has. My knowledge of what the program should do came from your article."

White calls his outliner program *ThinkPot*. Written in assembly language, it can handle outlines up to six levels deep. It is about 5K long and makes extensive use of OS-9 Level II's overlay windows. White is definitely on the right track.

Presently, *ThinkPot* has commands for cutting and placing headlines, changing the data directory, making a hardcopy to a printer and creating a disk file (the whole outline or only those items under the headline selected). You can also load outline files from your disk and call an OS-9 shell to use other tools while running *ThinkPot*.

You can find out how to run *ThinkPot* by pressing the question mark key. Unfortunately, White does not let you know this in his opening screen. However, once you discover the trick, you can learn everything you need to know with a single keystroke.

NEW FOR OS-9™: *FORTH09* ™
from D. P. JOHNSON

FORTH09 is a FORTH-83 Standard implementation specially taylored for OS-9. Includes the double number extension word set, system extension word set, complete forth 6809 assembler and more. Programs written in forth can instantly be saved as compact executable machine language modules. The FORTH09 system runs on any level I or level II OS-9 (6809) machine with at least 32k of available memory and one disk drive. Saved Forth09 application code is romable, reentrant and fully position independent, requiring as little as 3k for a small program. Where maximum speed is required the user can force small code words to be automatically compiled as in line code rather than subroutines. Supplied with complete printed documentation. **$150.00** (+ $3 S&H) Specify disk format if other than CoCo OS-9 format desired.

Other OS-9 SOFTWARE from D. P. JOHNSON

L1 UTILITY PAK - Contains 40 useful utilities that run under both level I and II OS-9. Included are a complete set of "wild card" file handling utilities, a disassembler, a disk sector editor, and the MacGen command language compiler. MacGen will allow you to generate many useful command macros in minutes, much more useful than procedure files. Macro source is included for a macro to implement an archival backup type function. **$49.95**

L2 UTILITY PAK - Contains a Level II "printerr" function that also **shows the pathname being searched for** when "not found" or permission type errors occur. Also contains level II software ram disk driver. Ten other utilities included, some useful for level I also . **$39.95**

L1+L2 COMBINATION PAK both of above together for **$75.00**

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All diskettes are in CoCo OS-9 format unless otherwise requested; other OS-9 formats can be supplied for $2.00 additional charge. All orders must be prepaid or COD, VISA/MC accepted, add $1.75 S&H for first software item, + .25 for each additional item, additional charge for COD.

D. P. Johnson, 7655 S.W. Cedarcrest St., Portland, OR 97223 (503) 244-8152 (For best service call between 9-11 AM Pacific Time, Mon.-Fri.)

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White's metaphor for *ThinkPot* is a series of file folders. The title of your outline appears in the "tab" of the large file folder. When you press the right arrow key to move to a subtopic under one of your headlines, the program opens another file folder a bit smaller than the original. It doesn't take long for the idea to grow on you.

I hope White will make use of the *WindInt* environment to add the standard menu techniques demonstrated during the last half-dozen columns. He also needs to add the ability to enter and link a complete text document to a headline. Once he does, he'll find himself hot on the heels of a hit program.

But first, White has a problem. He needs a publisher. Is anyone reading?

White had first planned to market his program through Tandy, but it has no current plan to market this type of program. If I were a software distributor, I would cut a deal with White. (Enough said?) In the meantime, White agreed to pass along some patches and assembly language source code that will help *XEd* users.

"I have patched the *XEd* screen editor by Eric Dokken to enhance its performance on the CoCo 3," White said. "First, I modified the `XCodes` module so that it automatically configures itself to any size window — not just 80-by-24. I also set it up to use the built-in OS-9 text commands and increase its speed."

Because some text commands will not work on a VDG device, White's version of *XEd* will not run on a VDG screen. White's modified version no longer scans the keyboard with `GetStt` calls. With this patch, *XEd* no longer uses system time while waiting for a key to be pressed; this change is a real plus in a multitasking environment. Unfortunately, with this modification, the cursor blink feature no longer works. Delete those codes from the `XCodes` module.

The following is the *XEd* modpatch listing:

```
l xed
c 1798 17 12
c 1799 07 12
c 179A F9 12
v
```

After you make this patch, change the cursor on/off codes in the `XCodes` source file as follows:

```
curon      fcb 0      cursor on
curoff     fcb 0      cursor off
```

```
*wctl
echo Pick one of the following:
echo 1 Graphics 640x192 (black on white 4 color)
echo 2 Graphics 320x192 (16 color)
echo 3 Text Window
echo 4 Over and Under W4 W5
echo 5 Graphics 640x192 (white on black 4 color)
prompt Choose:
var.0
if %0=1
    display 1b 24 1b 20 7 0 0 50 18 2 0 0 1b 3a c8 01
    display 1b 21 </1 >/1
else
if %0=2
    display 1b 24 1b 20 8 0 0 28 18 0 1 0 1b 3a c8 02
    display 1b 21 </1 >/1
else
if %0=3
    display 1b 24
    display 1b 20 2 0 0 50 18 0 2 3 1b 31 2 0 >/1
else
if %0=4
    wmode /w4 col=50 row=d wnd=4 val=1 sty=2 cpx=0 cpy=0 fgc=0 bgc=2 bdc=3
    wmode /w5 col=50 row=a wnd=5 val=1 sty=ff cpx=0 cpy=e fgc=0 bgc=2 bdc=3
    iniz /w4
    shell i=/w4&
    echo Go to w4 and start a shell for w5
else
if %0=5
    display 1b 24 1b 20 7 0 0 50 18 0 2 2 1b 3a c8 01
    display 1b 21 </1 >/1
endif
clrif
```

Figure 1

```
* - a YModem Batch standard for OS-9
 BLOCK 0
 BYTE 1
  -- SOH (01) for 128 byte block
  -- or STX (02) for 1024 byte block
 BYTE 2 - 0
 BYTE 3 - $FF
 BYTE 4 + n -- null terminated filename (no pathlist)
 OPTIONAL FIELDS start here -- these fields should be set
   to NULL if not used.
 file size -- variable length decimal number terminated
   with $20.
 OS-9 Modification Date (five bytes) -- followed by $20.
    Byte 1 : YEAR
    Byte 2 : MONTH
    Byte 3 : DAY
    Byte 4 : HOUR
    Byte 5 : MINUTES -- followed by $20
  File attributes - FD.ATT -- followed by $20.
  Serial Number -- set to NULL followed by $20 reserve for
 Owner -- FD.OWN -- two bytes long
    Byte 1 : msb
    Byte 2 : lsb followed by $20
  Creation date -- FD.DATE -- Five bytes long
    Byte 1 : YEAR
    Byte 2 : MONTH
    Byte 3 : DAY
    Byte 4 : HOUR
    Byte 5 : MINUTES -- followed by $20
  CoCoBin II specs begin here
  Offset to ICON data
  ICON Size
  Offset to AIF data
  AIF Size
  Offset to start of file data
  Compression Flag (five bytes)
  $00000 = uncompressed
  Unused bytes up to byte 131 (1027) must be filled with $C9
  BYTE 132 (1028) -- XModem CRC MSB
  BYTE 133 (1029) -- XModem CRC LSB
```

Figure 2

Listing 1 is the source for `XCodes.CC3`.

Speaking of Competition

Bill Brady, author of the *WizPro* terminal emulation, had better watch out — competition lurks on the horizon. During the past several months Merle Kemmerly (TOOK3 on RAINBOW's Delphi OS-9 Online SIG) has been working on a communications program called *Telstar.*

Kemmerly's program is menu-driven and features hot keys, macros with translation characters, and a virtual buffer that writes to the disk when full. It can upload or download files using the Xmodem.CRC, Xmodem checksum, Ymodem.CRC, Ymodem checksum or ASCII text protocols. *Telstar* lets you make a hard copy while receiving and changes its configuration on the fly. It can serve as an OS-9 gateway that lets remote users perform OS-9 commands, and it features a useful repeating auto-dialer that can store up to 50 numbers.

To run *Telstar*, you need OS-9 Level II, an RS-232 Pak, an 80-column text screen and a 128K (512K recommended) CoCo 3. A RAM disk is also recommended.

Good News For Downloaders

CoCo users might be interested in a coalition that just may be forming between Brady and Kemmerly. The two are talking about a Ymodem batch standard for OS-9. The question now is whether or not CompuServe will support Ymodem and Ymodem batch. Both Delphi and GEnie do at this time.

Kemmerly says that while he has received many requests for a Ymodem batch file transfer facility in *Telstar*, there must first be a standard that all OS-9 Ymodem batch programs follow. Kemmerly explained that he has studied the protocol that OMEN Technology (creators of Ymodem) has proposed for UNIX systems and believes that it would be the best starting point for a CoCo standard Ymodem batch protocol.

We are publishing Kemmerly's proposed Ymodem batch protocol here (see Figure 2). You'll notice that the position of the fields after Byte 4 are not shown. Their location depends on the length of the file name. Notice also that the data size of Block 0 can be either 128 bytes or 1024 bytes. Kemmerly feels that 128 will be enough in most cases.

While we're on the subject of standards, Kemmerly also sees a need for a standard for programs that use configuration files. "As the number of people using hard drives increases, owners are becoming more conscious of the location of and the data in their files," Kemmerly states. "It would be much easier to set up these locations if some standard were available. I would be glad to change my programs to use these new standards if they are implemented and approved by the OS-9 Users Group. However, this is a decision the OS-9 community needs to make. Please send any comments or suggestions to the leaders of the OS-9 Users Group. Maybe they can set a standard that will provide a better environment for us all." (Amen!)

Our Turn to Help

Steve Goldberg has been helping readers in these pages for more than three years. Now it's our turn to help him.

Goldberg has developed a fast and easy method to produce and maintain bootable double-sided 40-track system disks for OS-9 Level I Version 2.0. You can start with a previously patched `CCDisk` module in your system boot file. You will no longer need to `OS9Gen` a completely new boot file. Additionally, a special command named `Dosfix` lets users of Disk BASIC Version 1.0 boot OS-9 from one disk — either single or double sided.

Goldberg has put together an OS-9 Level I software package called *The Doubler*. It includes six utilities. Here's the good news: He'll sell you *The Doubler* for only $15.

If you are still using OS-9 Level I, how about helping him out by ordering this package from Steve at 695 Plainview Rd., Bethpage, NY 11714. By the way, ask him if he's still selling his fantastic utility package. He was selling the set for $2 per utility. I use the package all the time and don't believe you can find a better set of tools for three times the price.

MakeDouble patches `CCDisk` in OS-9 Level I so it can read parameters from your device descriptors and read, write or format single- or double-sided 40-track bootable disks. It rearranges the `OS9Boot` file and system boot track on the double-sided disk so that it looks like a single-sided disk to Disk BASIC and the boot file. You can make the changes to your boot file permanent — as long as the module length doesn't change — with *Saveboot*. This utility takes the place of `Cobbler`, which does not work with a disk created by Goldberg's package.

Have a happy holiday season and a prosperous New Year, and I'll see you next month. ☐

Don't miss our annual Christmas Music Sale!

Until December 31, you can purchase a disk filled with Christmas music for only $9.95 (regularly $14.95). The complete **Lyra Lybrary**, an extensive collection of music to use with your MIDI synthesizer, normally sells for $179.40 for the 12 disks, now is only $100.00. That's a savings of almost $80! Or choose from a wide variety of music ranging from Bach to the Beatles. Each disk is packed with 5-8 part music, and takes 50 to 80 minutes to play. Each disk $14.95.

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Other good stuff: **FB-01 Calc** is a program that creates event files for Lyra so you can set up custom configurations for your FB-01 from Lyra. Includes a manual packed with useful information about your FB-01. A must if you have an FB-01! $19.95. Having fun with your synthesizer but frustrated by the poor editing capabilities of the MIDI recorders currently available for the CoCo? You'll love our new **LyraRecorder** packed with features and power! Inquire for price and availability.

Ordering information: send check or money order. Sorry, no credit cards. COD is ok. Shipping and handling included in price. CA residents add 6% tax.

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Imperial Beach, CA 92032
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The listing: `XCodes.CC3`

```
 nam XCodes.CC3
 ttl XCodes for CoCo 3 display modes

 ifpl
 use /dd/defs/os9defs  link the system definitions
 endc

* XCODES
* by Eric Dokken for the CoCo
* modified for CoCo3 and Windows by Brian C. White

 opt g
 org 0

endmem equ . No data space
vers equ 4 Version number
 mod endmod,name,$21,$82,entry,endmem
name fcs "xcodes"
 fcb Vers

entry bra goto    branch to code to position cursor
 bra getxy        branch to code to return # of char/line and # of lines

* these codes must be at this offset from Entry
currit fcb 6      move cursor right character
curup fcb 9       move cursor up character
crchar fcb $ae    printable carriage return character (degrees symbol)

init   fcb 0      initialization- size and characters
cls    fcb 1,12   home cursor and clear screen
ceol   fcb 1,4    clear to end of line
ceof   fcb 1,11   clear to end of frame

invon  fcb 2,$1f,$20    inverse on
invoff fcb 2,$1f,$21    inverse off
scdown fcb 2,$1f,$30    scroll down
curon  fcb 2,$05,$21    cursor on
curoff fcb 2,$05,$20    cursor off

* this routine returns the number of characters per line
* in A, and the number of lines in B.

getxy
 pshs x,y
 lda #1
 ldb #SS.ScSiz
 os9 I$GetStt           get # char/line, # lines
 tfr x,d
 pshs b
 tfr y,d
 puls a,x,y,pc

* On entry A contains X-coordinate
*          B contains Y-coordinate

goto equ *              entry point of cursor positioning routine
 pshs a,b,x,y
 leas -8,s
 adda #32
 addb #32
 std ,s
 leas -1,s
 lda #2
 sta ,s
 lda #1
 tfr s,x
 ldy #3
 os9 I$Write
 leas 9,s
 puls a,b,x,y,pc

 emod
endmod equ *
 end
```

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette or disk) to:

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Accessible Applications

Create the perfect boot disk

Boot Modifications

By Richard A. White
Rainbow Contributing Editor

Last month we discussed the simplest ways to make a new boot disk (using `BackUp` and `Cobbler`). We probed the nature of the Kernel and `OS9Boot` files — the heart of a boot disk. We also discussed using `Dsave` to copy the rest of the files needed onto a new boot disk.

`BackUp` and `Cobbler` are limited because they do not allow you to configure your `OS9Boot` file to the exact hardware on your specific system. (While `Cobbler` lets you make a new boot with changes to certain descriptor files, it does not add or delete drivers and descriptors.)

The first tool available that could be used to make major changes was `OS9Gen`, which was supplied with the Level I Version 1.0 package. Version 2.0 added `Config` to simplify the process. `Config` was also provided with Level II. `Config` is a front-end program that uses `OS9Gen` to make `OS9Boot` and to put both that file and the Kernel on the new disk. These utilities change only the `OS9Boot` file. The Kernel remains the same in all cases.

`Config` finds the modules that will go in your `OS9Boot` file in the `MODULES` directory. Figure 1 shows the directory from the Level II `Config` distribution disk.

```
HELP         term vdg.dt  term_win.dt   w.dw
w1.dw        w2.dw        w3.dw         w4.dw
w5.dw        w6.dw        w7.dw         p.dd
t1.dd        t2.dd        t3.dd         m1.dd
m2.dd        Pipe.dd      d0 35s.dd     d1_35s.dd
d2_35s.dd    d3_35s.dd    ddd0_35s.dd   d0_40d.dd
d1_40d.dd    d2_40d.dd    ddd0_40d.dd   d1_80d.dd
d2_80d.dd    os9p2        Init          IOMan
RBF.mn       CC3Disk.dr   SCF.mn        CC3IO.dr
vdgint.io    grfint.io    printer.dr    sio.dr
aciapak.dr   modpak.dr    Pipeman.mn    Piper.dr
clock.60hz   clock.50hz   cc3go         Bootlist
```

Figure 1

All modules in the system disk's `OS9Boot` and several others are in this directory. Any additional modules you make, pick up with software packages, or obtain in another manner should be copied into this directory. Since you *always* make a copy of the actual distribution disk from which to work, you can delete the modules you know you won't need from your working disk.

Note the specific extensions of the modules. These code the module type and are used by `Config` to present menus of each type of module from which to select. Modules without extensions are regarded as mandatory in a boot, but may be replaced with another module that performs the same functions. The module extension code `.mn` means that the module is a manager.

`RBF.mn` is the random-block-file manager that handles disk-drive input and output through the driver `CC3Disk.dr`. `CC3Disk` deals with only floppy disk drives. Therefore, if you have a hard drive, you will need to add a driver for that drive, which will be managed by `RBF`.

There are three types of device descriptors in the `MODULES` directory. They are coded `dt` (terminal descriptor), `dw` (window descriptor) and `dd` (drive descriptor). A descriptor is a data table whose entries describe the characteristics (number of sides or tracks, head-stepping rate, etc.) of a particular device.

Level II provides descriptors for three types of drives: 35-track single-sided, 40-track double-sided and 80-track double-sided. The 35-track descriptor, `35s.dd`, matches the characteristics of the original CoCo drives and is coded for a 30-ms stepping rate. Recent CoCo drives, like the FD502, support 40-track, double sided, 6-ms operation — coded into `40d.dd`. Descriptor `80d.dd` supports 3½-inch drives.

Richard White lives in Fairfield, Ohio, has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the co-author of the TIMS *database management program.*

Drive descriptors are also coded by the drive number to which they refer (e.g., `/d0`, `/d1`, `/d2` and `/dd`). Level II supports a default drive, which is the `/dd` descriptor. Only descriptors for a `/d0` default are provided. However, there is no reason the default could not be another drive if an appropriate descriptor for that drive were provided.

Someone just getting started with Level II should select descriptors that will work with their drives even if these descriptors do not fully use the capabilities of the drives. For example, if you have a 40-track, single-sided, 6-ms drive, use the 35-track descriptors to start up. Later, you can address the question of how to modify your boot to fully use the drives. One solution would be to replace your drives with 40-track, double-sided, 6-ms units. These are the only 5¼-inch, double-density drives currently made, and 360K of storage per disk is nice to have. If you replace your drives, you then need to make a new boot using the `40d.dd` descriptors.

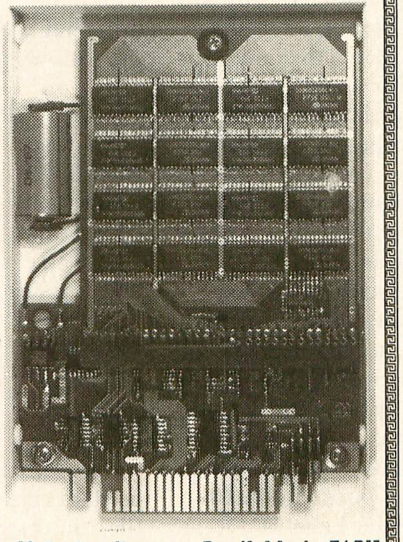
Level II graphics are extremely powerful. In addition, they are confusing to new Level II users. The confusion starts when you make your first boot. To begin, the driver `CC3IO` *must* be in your boot. Next, there are two types of display: VDG and Window. The VDG system provides compatibility with the older CoCo 2 screen and graphics modes and with some advanced CoCo 3 graphics capabilities. It also has the advantage of being the faster of the two systems and uses the least memory. For these reasons, most OS-9 games for the CoCo 3 use the VDG system.

Three modules are used for VDG graphics: the terminal descriptor `term_vdg.dt`, `vdgint.io` and `GrfDrv`. Additional implementation code is contained in `vdgint.io`. This interface may be viewed as a necessary supplementary module to `CC3IO` because it provides VDG support. Finally, there is `GrfDrv`. This module does not go into your boot but must be in your default drive's `CMDS` directory. It is loaded automatically after `OS9Boot`. (I wish I had a dollar for every time someone forgot about `GrfDrv`.) If `/d0` is your default drive and you have `GrfDrv` in the `CMDS` directory of your boot disk, you won't have any trouble.

Trouble generally comes when you try to work out some special boot strategy. (OS-9 almost invites one to strategize.) Before I got my hard disk, I used a two-drive boot sequence. Because I had 512K, I loaded a bunch of applications into RAM with commands in my `StartUp` file. All of these applications were on an applications disk in `/d1`, which left plenty of room on my boot disk. Many files normally on a boot disk found their way onto my applications disk. To set up this disk, I copied and deleted a lot of files. In situations like this, mistakes come easily, and an obscure file like `GrfDrv` can be lost. A similar thing can happen to `Shell` since it, too, is loaded automatically and is generally invisible to the user.

Don't get me wrong. Working out new boot strategies can be as much fun as playing an Adventure game, and its benefits are longer lasting. However, you must preserve the boot disks you start with. (Write protect tabs are for more than resealing the potato chip bag.) If things go wrong, you will be able to start over. And don't get too upset when things do go wrong. After all, Murphy is still enforcing his laws.

Let's return to the VDG system. Your OS-9 distribution disk and most game disks come ready to boot into the VDG system. Unfortunately, VDG does not



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support windows, which are one of the big advantages of OS-9 Level II. To use windows in this situation, you must replace the VDG system with the Window system. This means substituting `term_win.dt` for `term_vdg.dt` and replacing `vdgint.io` with `grfint.io`. `CC3IO` must be in your boot and `GrfDrv` must be in your default `CMDS` directory. In addition, you must include `w.dw` in your boot and *may* include any or all of the other window descriptors, `w1.dw` through `w7.dw`. Descriptors `w1` through `w7` are predefined for various window sizes. You may want to include them all and experiment with them. Later, you can make another boot that includes just the ones you want. They don't take much memory space sitting in the boot.

If you have 512K, you can include both `vdgint` and `grfint` in your boot. For now, use `term_vdg` for your terminal screen and live with its 32-character display on boot. You will be able to run software requiring VDG from this screen.

You will also need to include window descriptors in your boot. `Config` will not include window descriptors. Later, we will discuss making boots without using `Config` (which is necessary if you want to include both interfaces).

Thus, to make a boot using the VDG system, choose the `term_vdg` descriptor. `Config` will then include `term_vdg` and `vdgint` in the boot. If you do anything else that would let `Config` copy a full command set to the new boot disk, make sure `GrfDrv` and `Shell` are in the `CMDS` directory of that disk. If you want a boot with window capability, you need to choose `term_win`. Then you may choose the window descriptors (`/w1` through `/w7`) that you want in the boot. Make sure you include `/w`.

Next there are the sequential character file (SCF) modules. These include the driver `Printer`, its descriptor, `/p`, and the various serial port options. Let's discuss serial port options. First, the CoCo 3's serial port is useless for two-way (modem) communications under Level II. *No terminal package* uses the CoCo 3 serial port under Level II. Don't bother putting `/t1` into your boot.

If you want to use telecommunication, add either the `/t2` or the `/t3` descriptor. The `/t2` descriptor is used by the `ACIApak` driver, which requires the RS-232 Pak to be in Slot 1 of your Multi-Pak Interface. The `/t3` descriptor is used by the `Modpak` driver and requires the Modem Pak, which goes into Slot 2 of your Multi-Pak Interface. `Config` will choose the right drivers for the descriptors you choose, and you can have more than one driver/descriptor combination in your boot.

Finally, let's discuss the `Pipeman` manager, `Piper` driver, `Pipe` descriptor combination. This combination implements the pipe system — where one program's output can be routed to another process input for further work. I include these in my boot and use pipes with some frequency.

Now you should know everything necessary to make a new boot using `Config`. (Well, almost everything — there are a few things even I forget.)

Begin by formatting a fresh disk. If you booted from a backup of the system disk that came with your Level II, you are using a 35-track, single-sided disk because that is the only drive descriptor in the distribution boot. Next, put the backup of the `Config` disk in Drive 0. (I hope you have two drives, or you'll go nuts swapping disks). Since you have changed disks in Drive 0, you now need to change both your data and execution directories. (In this instance, `CMDS` is your execution directory.) Just type `chd /d0;chx /d0/cmds`, and press ENTER. Now enter `Config` and follow the instructions in the program and in your manual.

Unfortunately, `Config` does not do a complete job. To receive information about your new system disk, use the commands `Free` and `Dir`. The information that you receive will be similar to the following:

For the `Free` command:

```
"os9 boot 35 track" created on:
88/09/05
Capacity: 630 sectors (1-sector
clusters)
142 Free sectors, largest block
142 sectors
```

For the `Dir` command:

```
Directory of . 17:50:56
OS9Boot     CMDS        startup
```

The entire `SYS` directory and its contents are missing. A number of other files on the root directory of the distribution disk are missing as well (though these are not all that important). You could manually make a `SYS` directory on your new boot disk and copy over all the files therein. However, it's probably easier to use `DSave` by typing the following:

```
OS9:dsave /d0 /d1 ! shell
```

Those who have used Level I may not have seen `DSave` used in this way since

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this use is not shown in the Level I manual. However, that command line works for Level I or II as long as `Pipeman`, `Piper` and `Pipe` are in `OS9Boot`. The command line tells `Dsave` that the source drive is `/d0` and the target drive to which to copy is `/d1`. The line also tells `DSave` that its output will be *piped* to `Shell`, processed and acted on directly, rather than be sent to the standard output device and redirected to a file. `DSave`'s output is a `Shell` procedure, or a script of commands that `Shell` understands like `Tmode`, `Load` `MakDir`, `Copy` and `Unlink`. The `Dsave` output could have been sent to a file and edited before being used to copy files.

When you use `Dsave`, it will try to make a `CMDS` directory and copy files into it. However, `Config` has already made this directory. Don't worry. The first thing `DSave` does is set the `Shell` to proceed to the next command in case of an error. Therefore, each time `Shell` finds the requested procedure has already been done, it prints an error message and goes to the next command.

At this point, you have a 35-track, single-sided boot disk; use the boot to make sure it is good. If you have double-sided drives, you should include the `40d` descriptors so that you can read, write and format double-sided disks. Why not test your boot disk by formatting a few disks? After all, the next operation should be to make a double-sided boot disk.

If your new boot disk boots, make a boot on a double-sided disk if your `/d0` drive is double-sided. Additionally, since you are going to do this, you might as well tailor your printer and serial modules to match your system.

The default setting for `/p` is 600 baud. Most people run printers that support 1200 or 2400 baud, and if you have a serial-to-parallel interface, you can run at 9600 baud. `Xmode` changes the various `SCF` descriptors, like `/p` and `/t2`, in memory. If you then use `Cobbler` to make a new boot disk, the `OS9Boot` modules in memory are used to make the `OS9Boot` file on the new disk, and the present descriptor settings are saved with the descriptors. When typed at the `OS9:` prompt, the following lines will make the identified changes:

```
OS9:xmode /p baud=3       *For 1200
baud printer
OS9:xmode /p baud=4       *For 2400
baud printer
OS9:xmode /p baud=6       *For 9600
baud printer
```

Similarly, you can change `/t2` to the appropriate baud rate to use with your modem:

```
OS9:xmode /t2 baud=3       *For
1200 baud modem
OS9:xmode /t2 baud=4       *For
2400 baud modem
```

(Remember that `/t1` and the serial port will not work with a modem under Level II.)

`Shell` treats everything after an asterisk as a comment. I have used * to set off the comments that don't need to be typed when entering the `Xmode` commands.

To `Cobbler` a new boot disk, put a freshly formatted disk in one of your drives. I will use `/d1` for the example and type the following:

```
OS9:cobbler /d1
```

`Cobbler` works quickly. When it has finished, the computer will present a directory of `/d1` similar to the one below:

```
Directory of /d1 17:35:16

OS9Boot
```

That's a start, but a boot disk needs at least a `CMDS` directory and commands, a `SYS` directory and its files, and a `StartUp` file. `DSave` will copy all these from your old boot disk to the new one and make new directories as it goes. With the old boot disk in `/d0` and the `Cobblered` disk in `/d1`, use the following command line once again:

```
OS9:dsave /d0 /d1 ! shell
```

Let's see what making a new 40-track, double-sided boot disk accomplished. When we type the commands `Free` and `Dir`, our *original* boot disk displays the following information:

For the `Free` command:

```
"os9 boot 35 track" created on:
88/09/05
Capacity: 630 sectors (1-sector
clusters)
51 Free sectors, largest block 51
sectors
```

For the `Dir` command:

```
Directory of /d1 20:46:57

OS9Boot CMDS startup SYS
window.t38s window.t80s
window.glr4
```

If we use `Free` and `Dir` on our new 40-track, double-sided disk, we will see the following information on the screen:

For the `Free` command:

```
"os9 boot 40 track ds" created on:
88/09/05
Capacity: 1,440 sectors (1-
sector clusters)
861 Free sectors, largest block
663 sectors
```

For the `Dir` command:

```
Directory of /d0  20:49:20
OS9Boot SYS CMDS startup
window.t38s window.t80s
window.glr4
```

With 861 free sectors, it seems that we have a lot of storage, but there are only OS-9 system procedures on the disk. Once we start to put application modules and their files on the disk, those sectors will disappear in a hurry. Note that the largest block is only 663 sectors. The Kernel is still in Sector 35 of the top side of the disk, dividing the free sectors into two blocks. Don't worry, however; OS-9 can still use the inner sectors beyond the the Kernel.

Let's test the disk by rebooting with it. If it works, make a backup of the your new boot disk. Sometimes a new boot disk does not work. Generally, this occurs when `OS9Gen` is used to make substantial changes in the boot. (The procedure described in this article works — I just did it.) Some boot failures seem to have no cause. While there have been many reasons and fixes suggested for them, we simply do not know why some boots won't work and others do. One school of thought holds that the order of modules in the boot is important, but I have not seen definitive data that offers this correct order. Indeed, some people have reported some very odd sequences that worked while more normal orders did not. If you get a boot failure, first verify that `GrfDrv` and `Shell` are in your `CMDS` directory. If you used that option to choose which command modules were to be copied, you might have forgotten one or the other.

Unlike users with a double-sided drive, those of you running with a single-sided drive `/d0` have only 51 sectors left after completing our boot disk. Next month, I will ease this problem by discussing which files and commands can be deleted safely.

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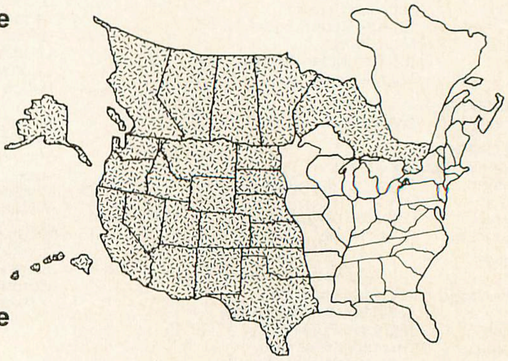

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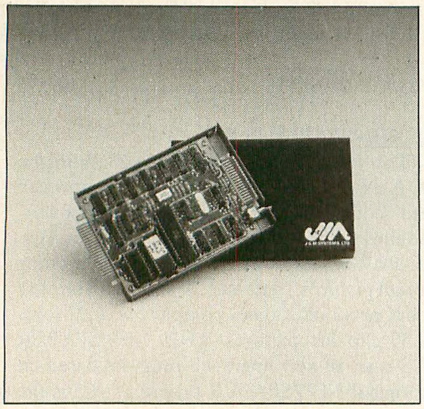

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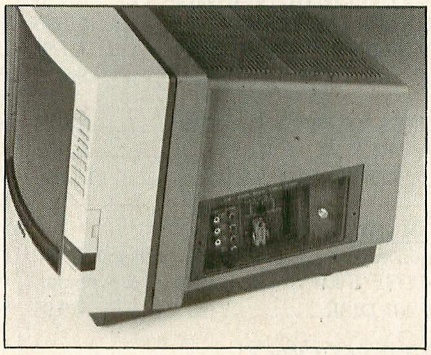

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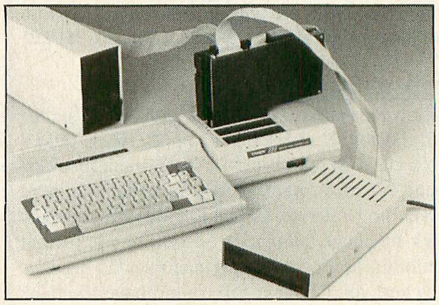

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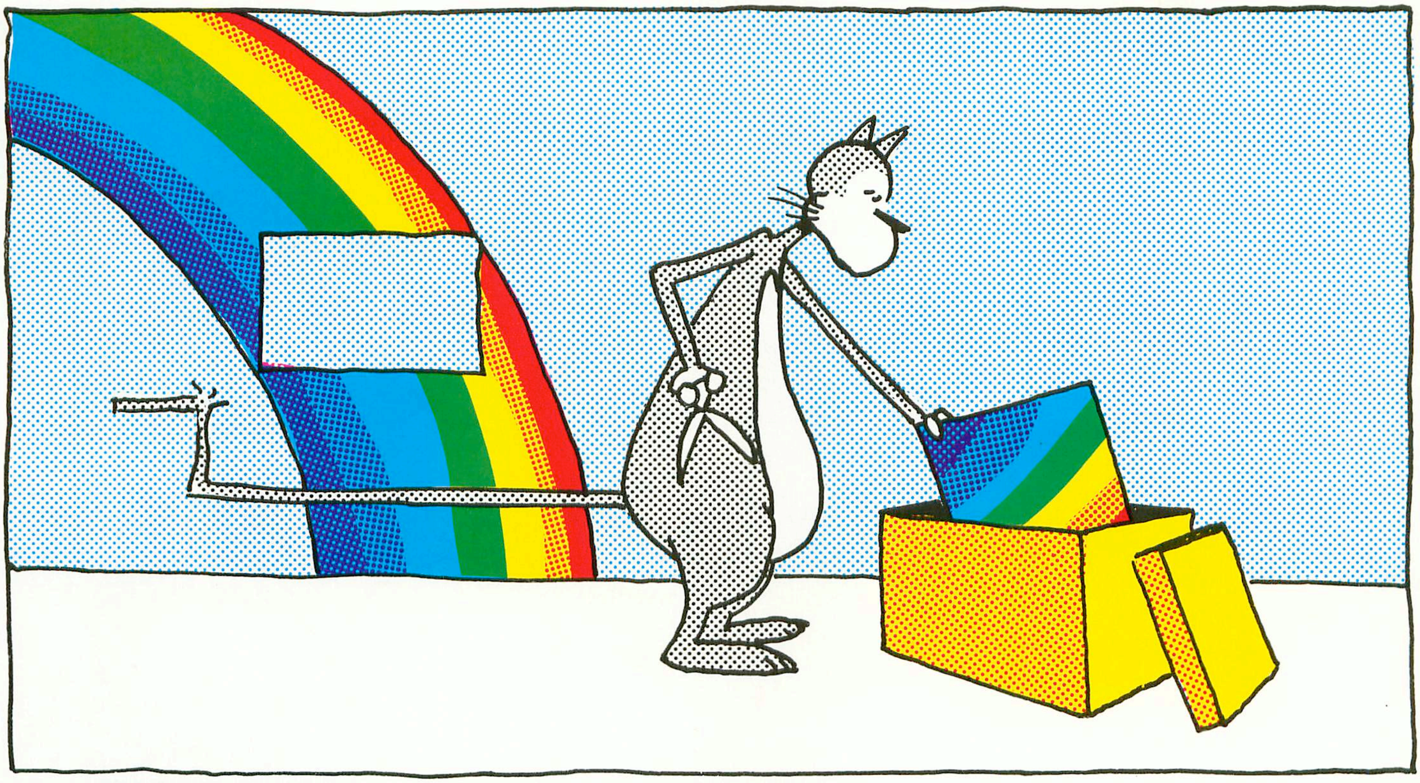

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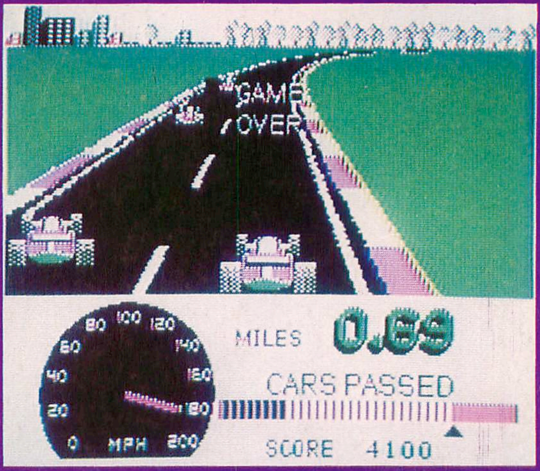

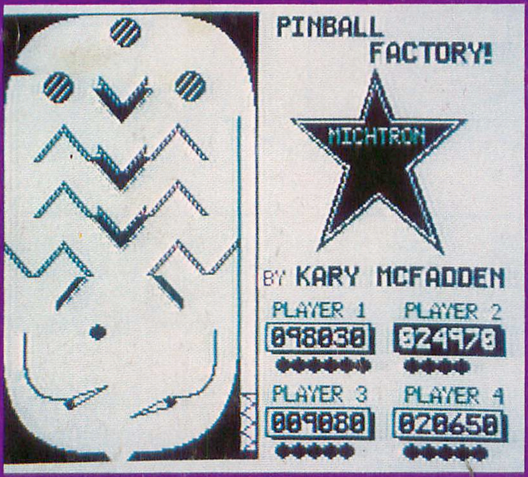

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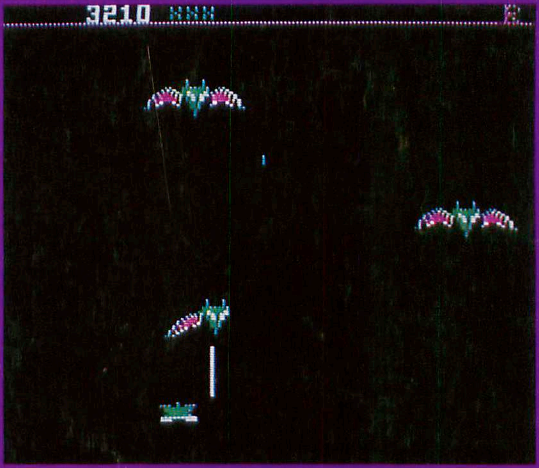

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